DICTIONARY OF COSTING

R. J. H. RYALL

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DICTIONARY OF COSTING

BY

R. J. H. RYALL

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WITH A FOREWORD BY

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FOREWORD

Costing is assuming every day greater importance in connection with industry.

Costing is comparatively a new science and it is not to be wondered at that inexactitude in terminology has crept in. To obtain the fullest value it is necessary that the language of costing be clear and definite, and I feel sure the Dictionary of Costing will be invaluable to all cost accountants and also to the student of the future.

It is becoming abundantly plain that any business which fails to set up a reliable costing system will find itself sooner or later in difficulties. Our competitors in foreign countries have gone far in this direction, and to enable competition to be successfully met both at home and abroad reliable cost data are essential. A firm without this information is not only running grave risks itself but is a menace to the industry as a whole. For these reasons I am sure the Dictionary will be welcomed.

GEORGE BEHARRELL.

PREFACE

Nothing in the nature of a Dictionary of Costing has ever before been attempted, notwithstanding that the need for such a work of reference has been acutely felt for some time past.

The vast strides made in the science of Costing during the past few years, particularly in the direction of standard or predetermined Costing, have brought into use many new principles and data.

There are to-day many excellent volumes which deal with a specific phase of Cost Accountancy, or describe a system peculiar to one trade only, but consequently do not give the cost accountant, the manager, or the student just the information he requires under any definite heading.

The author's aim, therefore, has been to produce a work which shall take its place as the standard book of reference in the Costing profession, by arranging into dictionary form a representative collection of matter covering the fundamentals of present day Cost Accountancy in such a manner that information on any desired subject may be referred to very easily.

The absence in the past of any recognized standard nomenclature or terminology in the Costing profession has been one of the greatest difficulties with which the cost accountant and student have had to contend, and an explanation of the general arrangement and method of indexing of this work may therefore be desirable.

The use of such terms as "Unproductive Labour," "Unproductive Materials," "Overheads" and the like have long since been discarded by most cost accountants for the reason that they do not correctly describe the items in question, and throughout this Dictionary an explanation or description of any subject or procedure is only given under the heading or title which is considered to be the more correct. The titles hitherto given to many of the routine forms have also been indefinite; as an instance, the term "Time Card" or "Clock Card" is commonly used, but such terms may refer to a record of the time of attendance at the factory, or a record of the time spent on a particular job, operation or process—two widely differing records. An attempt has therefore been made to choose more suitable titles and to justify this choice.

The general arrangement and indexing has been effected firstly by dividing the whole subject into the three elements of cost, viz., materials, labour and expenses, and, secondly, to subdivide and analyse each of these elements into their respective detailed headings. If information is required on a specific point and some doubt exists as to what is the correct term, reference should firstly be made under "Elements of Cost," which provides the key to the analysis of the subject and the main terms that are used in connection with each of the above elements.

That no standard terminology has existed may seem curious, but with the progress of the science little or no steps have been taken to cope with this important matter, and hence the anomaly. Readers are, therefore, courteously requested to bear this fact in mind. It is hoped that a matter of such vital importance as correct terminology may receive the attention and help of those interested.

My thanks are due to Mr. C. Hanneford Smith, F.C.W.A., for the valuable assistance he has freely given in connection with the preparation of the book.

R. J. H. RYALL.

London, W.C.

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DICTIONARY OF COSTING

ACCOUNTING DEPARTMENT—EXPENSES OF. The expenses of the Accounting Department, which will include salaries and all office expenses, stationery, etc., form part of establishment expenses. The treatment of this item in the cost accounts will depend upon the size of the concern and the total expense involved.

With small concerns, and in all cases where the amount of expense involved is not large, the item is best dealt with by allocating it to administrative expenses. This procedure is almost universally adopted on account of the fact that the Secretarial Department will also be merged with the Accounting Department, but with the very large concerns these departments will generally be separate and distinct, and in such cases the expense of the Accounts Department will be apportioned arbitrarily over the factory (or material expense), selling, and administrative sections of the business.

ADMINISTRATIVE EXPENSE CONTROL ACCOUNTS. (See Cost Control Accounts.)

ADMINISTRATIVE EXPENSES. A subdivision of establishment expense, and only includes those items of expenditure which are incurred in the general and financial administration of a business.

Administrative expense includes such items as: Salaries of directors, general manager, secretary, cost accountant, and their respective staffs, legal expenses, directors' fees, audit fees, insurance premiums for loss of profits, bank charges, interest on debentures and bank overdraft, patent fees and expenses; the expenses of the Secretary's, Accountant's, Cost Accountant's, etc., Departments, also a proportion of the cost of lighting, heating, depreciation and repairs and maintenance of buildings, etc.; and also the salaries of general clerical staffs, when not directly chargeable to the Factory or Sales Departments.

Most of the items that constitute administrative expenses can usually be allocated direct, such as—

Salaries of directors, general manager, secretary, cost accountant, etc., and of their respective departments.

Sundry Office Expenses of above departments.

Expenses of Capital, i.e. bank charges, interest on bank overdrafts and loans, debenture interest.

Directors' Fees, travelling expenses and salaries, etc.

Insurance Premiums other than fire, employers' liability, common law, and State, etc.

Legal Expenses, Patent Fees, Audit Fees, etc.

Examples of expenses that are usually "allocated" by apportionment—

Repairs and maintenance of buildings, if head office forms part of the main building or factory.

Lighting and heating of Administrative Departments, if head office forms part of the main building or factory.

Rates and taxes.

Postages, telephones, stationery, travelling expenses, etc., if not separately recorded.

The majority of the items that comprise the administrative expenses of a business will appear under the heading of "Constant Expenses," as they will not vary directly with the volume of output or trade done.

The total amount of the administrative expense is ascertained by preparing an "Expense Allocation Statement," and entering therein all the expenses of the business. Each item is then examined and allocated under the headings of—

1. Administrative Expense.
2. Selling and Distribution Expense.
3. Factory Expense.

Certain of the items can be allocated or apportioned direct over the Selling and Factory Departments, but those which cannot be so treated are extended in the administrative expense column, and upon completion of this work, i.e. "Allocation of Expenses," the total administrative expense is generally apportioned over the Factory and Selling Departments, according to the extent to which it is estimated each of these departments benefit by the general management.

The recovery of administrative expenses separately from the factory and sales expenses in costs can only be recommended in most exceptional instances, as the great amount of extra clerical work involved will more than outweigh any advantage that may be anticipated.

ADVANTAGES OF COST ACCOUNTANCY. (See OBJECTS AND ADVANTAGES OF COST ACCOUNTANCY.)

ADVERTISING. The expenditure incurred by a business in advertising its products should be dealt with in the cost accounts, according to how the money has been expended. The expenditure incurred in connection with the general advertising of a firm's products is usually regarded as a general charge to selling expenses and recovered upon the total sales. When a new line is placed upon the market and the special advertising expense incurred is very large, the amount is best dealt with by being spread over a fixed quantity of goods or a definite period. In such cases it may then be recovered as a direct charge in the manufacturing cost of the products.

The expense of advertising, when incurred to revive or increase the sales of an existing article, should be dealt with in exactly the same manner as that given above when marketing a new line.

ADVERTISING LITERATURE. (See CATALOGUES: COST OF.)

AGENTS' COMMISSIONS. (See COMMISSIONS ON SALES.)

ALL-IN COST. (See TOTAL COST.)

ALLOCATION OF EXPENSES. The work of analysing and distributing upon an equitable basis each item of expense to sub-accounts, which correspond to the groups into which the establishment expenses of a business are divided.

The actual basis upon which the expenses are allocated or apportioned to the respective sub-accounts will be determined firstly, by the nature of the item, and secondly, by the method that will be used for recovering the expenses in costs.

The work of "allocation" immediately follows that of "collection," and each of the items which have been collected and entered in the first three columns of the Expense Allocation Statement, as shown on pages 70 and 71, is examined and apportioned over the Factory, Selling, and Administrative Departments. This procedure is carried out in three stages: Firstly, there is the allocation of expenses to each of the three main divisions mentioned above; secondly, and in those cases where the administrative expense is not separately recovered in costs, to apportion this total over the Factory and Selling Departments according to the extent it is considered each benefits therefrom; and lastly, to subdivide the factory expenses to departments or processes, etc., as required by the method used for recovering such expenses in costs.

1. The main allocation of expenses is not a difficult matter, as it is only necessary to examine each item and ascertain whether it is a charge to one or more sections of the business. A detailed consideration of the more difficult expense items, and the basis of allocation, appears under their respective headings.

Upon completion of this work the Expense Allocation Statement is totalled, and the amount chargeable to each section of the business ascertained, as shown by the following *pro forma* statements. (Forms Nos. 1, 2, and 3.)

Form No. 1.

EXPENSE ALLOCATION STATEMENT

For Month Ending 30th June, 19........

A/c. No.	Description.	Total.	Allocation.		
			Administrative.	Selling.	Factory.
	Variable Expenses	£	£	£	£
A. 301	Advertising . .	100		100	
B. 258	Branch Office Exp'ns	300		300	
B. 259	Bank Charges . .	400	400		
C. 101	Commissions on Sales	500		500	
C. 102	Carriage (Purchases)	600		100	500
C. 103	Carriage (Sales) . .	700		700	
G. 59	Gas	800			800
I. 45	Insurance (Nat. H. and Unempl'ym't.	900	25	75	800
L. 92	Legal Expenses .	1,000	1,000		
L. 93	Lighting (Electricity)	2,000	200	400	1,400
P. 79	Printing and Stationery	200	50	100	50
P. 80	Power (Electricity) .	3,000			3,000
S. 30	Salaries . . . . . *etc.*	4,500	1,500	1,500	1,500
		£15,000	£3,175	£3,775	£8,050
	Constant Expenses	£	£	£	£
	Depreciation, Plant and Machinery .	6,000			6,000
	Depreciation, Bldngs.	5,000	1,000	1,000	3,000
	Depreciation, Heating Plant	4,000	1,000	1,000	2,000
	Insurance, Fire, etc.	3,000	1,000	500	1,500
	Rates and Taxes .	2,000	100	200	1,700
	Salaries . . . . *etc.*	3,000	1,000	1,000	1,000
		£23,000	£4,100	£3,700	£15,200

(**Note.** When a system of Control Accounts is in use, the entries for journalizing the above figures, so that the amount of expenses can be reconciled with the financial accounts, will be found under Cost Control Accounts (Expense Section).)

Form No. 2.

EXPENSE ALLOCATION STATEMENT

SUMMARY OF SERVICE ORDERS CHARGEABLE TO EXPENSE ACCOUNTS

FOR MONTH ENDING 30TH JUNE, 192........

A/c. No.	Description.	Total.	Allocation.		
			Administrative.	Selling.	Factory
		£	£	£	£
	Repairs and Maintenance—				
S.O. 110	Plant	1,000			1,000
S.O. 120	Machinery . .	1,100			1,100
S.O. 130	Buildings . . .	1,200	100	200	900
S.O. 140	Office, F. & F. .	1,300	300	1,000	
S.O. 150	Works, F. & F. .	1,400			1,400
S.O. 160	Heating Plant . .	1,500	100	200	1,200
S.O. 170	Patterns . . .	1,600			1,600
	etc.				
		£9,100	£500	£1,400	£7,200
		£	£	£	£
S.O. 210	Indirect Labour—				
	Supervision . .	100			100
S.O. 220	Shop Clerks . .	200			200
S.O. 230	Cleaning & Sweeping	300	50	50	200
S.O. 240	Material Handling.	400			400
S.O. 250	General Labouring	500			500
S.O. 260	Viewing, Etc. . .	600			600
	etc.				
		£2,100	£50	£50	£2,000
		£	£ .	£	£
S.O. 310	Storekeeping . .	700		100	600
S.O. 420	General Purposes .	800			800
	etc.				
		£1,500		£100	£1,400

2. Administrative expenses may be recovered in costs as a separate item or included with the selling and factory departments' expenses, and the choice of any one method will depend upon the nature and size of the business and the statistical information which it is desired the costing system

should furnish. In those cases where these expenses are included with the selling and factory expense rates, the total is apportioned according to the extent each department benefits by the general administration of the business.

Form No. 3.

SUMMARY OF EXPENSE ALLOCATION STATEMENTS

For Month Ending 30th June, 192........

	Total.	Administrative.	Selling.	Factory
	£	£	£	£
Variable Expenses .	15,000	3,325	3,675	8,000
Constant Expenses .	23,000	4,100	3,700	15,200
Service Orders—				
Repairs and Maintenance . . .	9,100	500	1,400	7,200
Indirect Labour .	2,100	50	50	2,000
Storekeeping, etc. .	1,500		100	1,400
	£50,700	£7,975	£8,925	£33,800

Continuing with the above figures, the allocation of administrative expenses on the basis of, say, 60 per cent to factory and 40 per cent to selling. would be effected, and the summary completed as shown by Form No. 4.

Form No. 4.

EXPENSE ALLOCATION STATEMENT

FINAL SUMMARY

	Total.	Allocation.		
		Administrative.	Selling.	Factory.
	£	£	£	£
Total Expenses, as per Summary . . .	50,700	7,975	8,925	33,800
Allocation of Administrative Expenses .			3,190	4,785
	£50,700		£12,115	£38,585

3. The allocation of expenses to the various factory departments or processes, etc., will proceed upon similar lines to

that described above, and each item dealt with on its correct basis. The allocation of the majority of expenses which have been collected by means of service orders should be more or less automatic, and the system of service orders should be so arranged that wherever possible they are charged to the department incurring the expense ; for instance, the repairs and maintenance of works' fixtures and fittings may, in most cases, be charged to a separate order used for each department, as also most forms of indirect labour, sundry shop supplies, etc., but those items which cannot be so treated are apportioned upon some basis which enables the expenses to be dealt with equitably.

The preceding statements are sufficient to explain the work involved when a system of service orders is in use, as many of the expense items will be automatically analysed to departments. When service orders are not used the work of allocation will require to proceed upon different lines, as most of the items must be allocated arbitrarily or upon some definite basis. Forms No. 5 and 6 are specimens of the various allocation statements that may be prepared under such circumstances, and before a final total of the factory departments' expenses can be arrived at. It will, of course, be realized that the actual number of statements and the amount of analysis that will be required will not only depend upon the size of the business, but also the method employed for recovering expenses in costs. For instance, if the percentage on direct labour method is used, no further analysis will be required, as the total factory expense, as shown by the statement above (e.g. £38,585), will be the expense figure to use in arriving at a rate.

When factory expenses are recovered by means of a departmental rate, whether expressed as a percentage on the direct labour of each department or at a rate per direct labour hour, it is necessary to allocate all expenses to departments.

This further allocation will usually be completed by two stages, as it now becomes necessary to adjust certain of the "service" expense items between two or more of the Service Departments in addition to allocating to them a proportion of such items as repairs to buildings, lighting, heating, etc. These latter items it will be noted were analysed by means of service orders in the statements given above.

Expenses must, therefore, firstly be allocated to both Service and Producing Departments, and, secondly, after arriving at the total expense of each Service Department, to apportion them over the respective producing departments.

Form No. 5.

FACTORY EXPENSE ALLOCA
To Service and Pro

A/c No.	Description.	Total per Summary.	Allocation.			
			Power Dept.	Repair Dept.	Material Stores.	Receiving.
	Repairs & Maintenance	£	£	£	£	£
	Plant	1,000	400			
	Machinery . . .	1,100		50		
	Buildings	900	20	10	10	10
	Works, F. & F. . .	1,400	40	50	60	25
	Heating Plant . .	1,200				
	Indirect Labour—					
	Supervision . . .	100	5	5	5	5
	Shop Clerks . . .	200	10		10	10
	Cleaning, etc. . .	200	30	10	20	10
	Material Handling .	400		25	200	50
	General Labouring .	500	25	50	50	25
	Viewing	600				100
	Storekeeping . . .	600			500	
	General Purposes . .	800	70	70	70	
	Depreciation—					
	Plant	2,000	800			
	Machinery . . .	4,000		200		
	Buildings	3,000	170	150	170	150
	Works, F. & F. . .	1,000	50	50	50	25
	Heating Plant . .	2,000				
	Welfare Expenses . .	1,000	50	50	50	25
	Power (Electric) . .	3,000	3,000			
	Lighting (Electric) .	1,400	1,400			
	Transport	3,000				
	Cranes and Hoists .	1,500			500	
	Nat. Health Insurance	800	50	50	50	25
	Salaries of Management	1,000	50	50	50	25
	Insurance (Fire) . .	1,500	100		500	
	Rates and Taxes . .	1,700	100	50	100	25
		£35,900	£6,370	£870	£2,395	£510

---

[1] *See also under the heading of the expense item.*

TION STATEMENT. No. 1
ducing Departments

Allocation (*contd.*)						
Trans-port.	Tool Room.	Tool Stores.	Heating.	Works Office Depts.	Pro-ducing Depts.	Basis of Allocation.[1]
£	£	£	£	£	£	
	100		200		300	Arbitrarily, or by direct analysis
	150				900	
10	10	10	10	10	800	
25	50	60	30	60	1,000	
			1,200			
5	5	5	5		60	Direct analysis, or proportioned according to the number of workers in each department
		10		60	100	
	10	20		20	80	
					125	
25	25	25	50		225	
	100				400	
		100				Arbitrarily, or by direct analysis
70	70	50	70		330	
	200		400		600	On value of plant, etc., in each department
	350				3,450	
100	170	170	200	100	1,620	
25	50	60	30	60	600	
			2,000			
25	50	60	30	60	600	Per number of employees in each dept.
3,000						
					1,000	Arbitrarily, or direct analysis
50	50	25	50	25	425	Direct analysis per pay-roll
25	50	60	30	60	600	Apportioned arbitrarily
100	100	50	150		500	On basis of values
25	100	25	100	25	1,150	On space occupied or values of buildings occupied
£3,485	£1,640	£730	£4,555	£480	£14,865	

FACTORY EXPENSE ALLOCATION STATEMENT. No. 2

Factory Expense to Producing Departments

Form No. 6.

A/c. No.	Description.	Total as per Summary.	ALLOCATION—PRODUCING DEPARTMENTS.								
			Turning.	Milling.	Drilling.	Planing.	Coil Winding.	Armature Winding.	Painting.	Assembly.	Test.
		£	£	£	£	£	£	£	£	£	£
	Repairs and Maintenance—										
	Plant	300	60	60	60	70	10	10	10	10	10
	Machinery	900	180	180	180	210	30	30	30	30	30
	Buildings	800	100	100	100	100	100	100	50	75	75
	Works, F. & F.	1,000	150	175	150	50	100	75	100	100	100
	Indirect Labour—										
	Supervision	60	10	10	10	5	5	5	5	5	5
	Shop Clerks	100	12	12	12	12	12	10	10	10	10
	Cleaning, etc.	80	10	10	10	5	10	10	10	10	5
	Material Handling	125	20	20	20	20	20	15	10	—	—
	General Labouring	225	40	40	40	35	10	10	10	20	20
	Viewing	400	65	65	65	65	30	50	10	40	10
	General Purposes	330	65	65	65	65	15	15	10	15	15
	Depreciation—										
	Plant	600	105	100	100	100	50	50	20	25	50
	Machinery	3,450	650	650	605	650	200	175	170	250	100
	Buildings	1,620	275	250	220	250	150	180	75	100	120
	Works, F. & F.	600	70	70	70	60	50	80	75	60	65
	Welfare Expenses	600	65	60	75	50	80	60	70	70	70
	Cranes and Hoists	1,000	150	150	175	300	—	—	—	125	100
	Insurance, Health & Unemployment	425	55	55	55	60	35	45	30	55	35
	Management (Salaries)	600	70	70	70	50	80	60	70	70	60
	Fire Insurance	500	60	65	50	30	70	65	60	50	50
	Rates and Taxes	1,150	190	160	180	195	120	115	75	55	60
		14,865									
	Power Department	6,370	1,150	1,475	1,350	1,225	250	310	50	210	350
	Repair Department	870	160	175	190	125	30	30	30	50	70
	Material Stores	2,395	410	470	390	450	275	250	90	35	35
	Receiving Department	510	80	90	65	55	70	60	50	20	20
	Transport[1]	3,485	550	480	475	455	480	425	120	250	250
	Tool Room	1,640	230	200	245	240	50	50	25	275	325
	Tool Stores	730	110	95	120	120	10	10	10	135	120
	Heating	4,555	650	570	590	450	550	475	500	400	370
	Works Office Departments	480	60	60	60	50	45	55	30	65	55
		£35,900	£5,802	£5,982	£5,797	£5,552	£2,937	£2,825	£1,805	£2,615	£2,585

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[1] Transport expense assumed to refer to incoming goods only; when the expense refers to both incoming and outgoing, the amount is apportioned to Factory and Sales on basis of value of materials received and despatched.

As the amount of information that should be given on any of the above statements will be determined by the method of recovering factory expenses, there is usually inserted at the bottom of the statement containing the allocation of expenses to producing departments, the total direct labour for the period, if the percentage on direct labour method is used, or the total direct labour hours of each producing department for the direct labour hour method, and in the case of a machine rate the number of standard or normal machine hours.

When a machine rate is used, the machine tools may be grouped or arranged in " batteries " according to type, size, and output, etc. A further sub-analysis of each department's expense may, therefore, be necessary, and in such cases this sub-allocation will be carried out in a similar manner to that described above, and the expenses of each producing department allocated over the respective machine tools or gangs.

The examples of expense statements given above will not necessarily be suitable under all conditions, as they must be specially arranged to suit the requirements of each case ; for instance, it is sometimes possible to combine them into two or three large statements instead of using a separate summary for each stage in the complete process of allocation.

APPRENTICES' PREMIUMS. The amount paid by way of premiums on behalf of apprentices is a credit to Factory Expenses.

Many firms will prefer that the administrative expenses shall receive credit for apprentices' premiums, but as the factory have to bear the expense of instruction, they should receive credit for any premiums paid. On the other hand, a company may regard the expenses attached to apprentices as a charge against profits, and in such cases the premiums may be credited to Profit and Loss Account. When the latter principle is adopted, some allowance should be made for the time given to apprentices by the factory supervision, etc.

AUDIT FEES. The expense incurred in connection with the annual audit of the company's accounts and balance sheet is a charge to the administrative expenses, and the amount, together with other items of a similar nature, is apportioned over the Factory and Selling Departments of the business.

BAD DEBTS. The treatment in the cost accounts of the amount of bad debts incurred may be in two ways. It may be regarded either as a charge to selling expense or a charge to administrative expense, and the choice of any one of these two methods will depend entirely upon the routine in regard to the passing or certifying of inwards orders for credit. If the Selling Department is responsible for this work, then the loss is a correct charge to the selling expenses, but in those cases where a separate "Credits" Department exists and is under the charge of either the secretary or accountant, the item is then a charge to administrative expense.

Care must be taken to differentiate between the amount of bad debts actually written off during the period, also any reserves created for bad debts, as the latter will not be included in the Establishment Expenses of the business.

BANK CHARGES. When charges are made by a bank for handling the account, the amount will form part of the establishment expenses and be allocated to administrative expense. The analysis of this item with a view to charging the respective sections of the business with their correct share is not recommended on account of the smallness of the amount usually involved.

BANK DEPOSIT—INTEREST ON. The inclusion in the cost accounts of the amount of interest received upon deposit accounts will depend upon the principle adopted in regard to interest on overdrafts, loans, and debentures, etc. If, therefore, the interest payable upon these latter items is included in costs, then it logically follows that interest received should form a credit in the cost accounts. In other words, if expenses of capital are an item of cost, then profits of capital should be included as a credit in costs.

When both interest receivable and payable are included, the treatment of the items may be rendered easier if an Interest Account is used, and the respective amounts debited or credited and the balance transferred to the respective expense accounts.

BANK OVERDRAFT—EXPENSES OF. The amount of interest and other charges relative to overdrafts is an item of establishment expense. The basis of allocation will depend upon the amount of expense involved. When the item is only small, it is best dealt with by being allocated direct to administrative expense, but if a considerable sum is concerned, the amount may then be apportioned to the Factory (or Material Expense) Selling and Administrative Departments. It should be noted, however, that if a very large amount of interest is involved and when most of the money is used for a specific contract or purpose, the expense incurred by such contract should form a direct charge to it. (See also DEBENTURES—INTEREST ON; also MORTGAGE—INTEREST ON.)

BARTH PREMIUM—METHOD OF REMUNERATING LABOUR. This method does not guarantee the day rate. The method of arriving at the amount to be paid is to multiply the standard time by the actual time, take the square root of the result and multiply by the hourly rate. This can be quite easily done on an ordinary slide rule. It offers a very poor incentive for production at the higher levels, and is too abstract to appeal to the average operator. Almost its sole advantage is that there is one fairly simple formula for all stages of production. Up to 100 per cent production it is more favourable than straight piece work. The standard time for this method is extraordinarily carefully set by means of minute time studies, to such an extent that errors in rate-setting hardly ever occur.

BILL OF MATERIAL. A bill of material is a specification showing the quantity and description of the various kinds of materials that should enter into a given product.

Bills of material are chiefly used in connection with the manufacture of standard products, but are also employed in those industries where the kind and quantity of the materials and parts required for the manufacture of non-standard products are definitely known. The advantages obtained by the use of bills of material are many; for instance, the standardization of operations is rendered more easy, since the specifications detail the kind of materials and parts which are best suited for the product or operation. In those cases, therefore, where the production departments have the choice of using different components for a particular article, or of using different operations or processes for making the same product, the production engineers are able to select which material, components or processes to use more intelligently than is the case when the information regarding the kind of materials and processes, etc., is not available in such a ready form.

A bill of material fulfils an important function in any costing system, as it enables the storekeeper to check the stores requisition when received, and so prevent the issue of excessive materials on a production order. Stores requisitions should, therefore, quote the reference number of the bill of material, so that the storekeeper can immediately refer to his copy in order to carry out this check.

A considerable amount of clerical labour is also saved, since full details of the materials required are given on the bill of material. It will, therefore, be seen that the Cost Department's copy of the bill can often be used as the material summary for the job, and in such cases the work of entering up the stores requisitions is reduced to the posting of the actual quantities issued from stores against each item and extending the total values.

A further advantage will also be obtained in regard to the work of writing out stores requisitions. Full details of the materials required need not be stated on each requisition, as the reference number of the bill of material and the item number or numbers will be the only information needed. Upon presentation of a stores requisition made out in this manner, the storekeeper simply refers to his copy of the bill of material in order to ascertain the kind and quantity of materials that are required.

A specimen bill of material is shown (Form No. 7). It will be noted that suitable columns are arranged for details of all materials, together with the weight and quantity of each item. The drawing number refers to the detailed or shop drawing, which gives dimensions of the part or component and the nature of operations to be performed. The symbols S., P., M., and P.M., are used to indicate the disposition of the various items ; for instance, the symbol " S." denotes that the material required is carried in stock for general production purposes ; " P." signifies that the material has to be specially purchased for the order, and that no work is to be performed on it, i.e. an assembly ; " M." indicates that the item is to be made ; and " P.M.," which means " purchase and make," refers to materials or parts that have to be purchased, and work performed on them before they will be ready for assembly. The use of the above or similar symbols enables one to see at a glance the disposition of all the items, and in addition such information acts as a guide to the Cost Department when collecting and summarizing the cost of the job or order.

A bill of material is usually issued in sets, the number of copies being determined according to routine. The specimens given show the Cost Department copy (Form No. 7), Stores copy (Form No. 8), and Planning Department copy (Form No. 9). The copies issued to the Production Departments of a factory are ruled exactly the same as for the Cost Department, excepting that the required and issued columns are omitted and the space left blank for use in the shops.

With regard to the Stores copy, the columns on the right

Form No. 7.

○ ○

BILL OF MATERIAL

Sym-bol No.	Drg. No.	Description.	No. per Set.	L'gth. per Piece.	Total No.	MATERIAL.				Remarks.	S. P. M. P.M.	Pur-chase Order No.	REQUIRED.				ISSUED.				
						Class.	Particulars.	Total L'gth. feet.	Total W'ght lb.				Price.	£	s.	d.	No.	W'ght. lb.	£	s.	d.

DESCRIPTION Assembly Drg. No.____	COST DEPARTMENT COPY. Date of Order No. of Sheets	Date of Delivery Sheet No. O/N.

Made up by		Checked by		Date Issued to Stores	Date Returned from Stores	Date Issued to Shops

Form No. 8.

BILL OF MATERIAL

Symbol No.	Drg. or Stk. No.	Description.	No. per Set.	L'gth. per Piece.	Total No.	Material.				Remarks.	S. P. M. P.M	Purchase Order No.	Req.	Date.	Quan.	Wgt. in lb.	Req.	Date.	Quan.	Wgt. in lb.	Req.	Date.	Quan.	Wgt. in lb.
						Class.	Particulars	Total L'gth. feet.	Total W'ght. lb.															

Description

Assembly Drg. No.______

STORES COPY.		
Date of Order	Date of Delivery	**O/N.**
No. of Sheets	Sheet No.	

Made up by		Checked by		Date Issued to Stores	Date Returned from Stores	Date Issued to Shops

Form No. 9.

○ ○

BILL OF MATERIAL

Symbol No.	Drg. or Stk. No.	Description.	No. per Set.	L'gth. per Piece.	Total No.	MATERIAL.				Remarks.	S. P. M. P.M	Purchase Order No.	Req.	Date.	Quan.	Wgt. in lb.	Req.	Date.	Quan.	Wgt. in lb.	Req.	Date.	Quan.	Wgt. in lb.
						Class.	Particulars	Total L'gth. feet.	Total W'ght. lb.															

DESCRIPTION

Assembly Drg. No.______

PLANNING DEPARTMENT COPY.

Date of Order	Date of Delivery	**O/N.**
No. of Sheets	Sheet No.	

Made up by		Checked by		Date Issued to Stores	Date Returned from Stores	Date Issued to Shops

hand side are ruled to accommodate particulars of the stores requisition number, and the quantity or amount of materials issued. This information is entered by the storekeeper's assistant before issuing the item, in order that the check referred to above can be carried out.

In regard to the Cost Department copy, the total materials and parts required for the job are extended in the " Required " column, and upon completion of the works or production order all the stores requisitions, which have been issued against each item, may either be summarized and entered in the " Issued " column or the Stores Department copy of the bill of material may be sent to the Cost Department. The issues, as noted thereon, are checked with the stores requisitions, and the total quantities then transferred from the Stores Department copy to the Cost Department copy.

The actual method of issuing bills of material to the various departments, as also the rulings of such a form, will depend upon the special conditions which obtain in each factory ; for instance, in those concerns where the products are definitely standardized, it is more convenient for bills of material which relate to standard products to be blue printed or typewritten, and in such cases the total quantity and values of materials " required " can be included on the blue print.

Bills of material, which are issued in connection with the manufacture of non-standard or special products, may be compiled by the engineers, drawing office, or other technical department and specially typed for each order, whereas with standard products the bills of material may be issued to the several departments and remain in their possession as a standing instruction.

BIN CARD. A bin card is a record card used by the storekeeper of all items of materials and goods contained in his stores, and in addition provides him with ready information as to the nature of the contents of any particular bin.

The rulings of bin cards differ according to the nature of the goods stored, but the illustration given on the next page will serve to indicate the essential features of such a form.

Bin cards may either be filed in drawers in order of bin number or material, or hung up in a convenient place on the outside of the bin or other receptacle, so that they will be available for making entries as and when goods are placed into the bin or taken out and issued to the factory for use on a production or service order.

With most concerns the various classes or types of materials are scheduled, according to their process of manufacture, and given a symbol number. Besides being an advantage from the point of view of production methods, this procedure saves a great deal of clerical work, as the reference number or symbol need only be quoted on the stores requisition, also bill of material, if used. When such a method is employed, provision must be made for this symbol to be stated on the bin card, and in the illustration given this is shown immediately below the name of the material.

Form No. 10.

BIN CARD

Article ....

....

Drg No.................. Symbol No.............

Bin No.			
Date			
Max.			
Min.			

Date.	Reqn. No.	In.	Out.	Balance.	Date.	Reqn. No.	In.	Out.	Balance.

(Convenient Size of Form 8″ × 5″)

All bins, racks, shelving, etc., should be numbered consecutively in order to indicate their location to the storekeeper and his assistants. This number also serves to connect the bin card with the bin or other receptacle to which it belongs.

Some storekeepers will favour the filing of the bin cards in drawers in place of hanging them outside the respective bins, as with large stores the assistants will not then be required to walk a distance to any bin before ascertaining whether the particular item required is in stock. On the other hand, it may be the practice for the storekeeper's clerk or other assistant to record all issues and receipts on the bin card in place of each assistant noting the issue at the time he hands out the goods, and in such cases the filing of the bin cards in drawers will no doubt be an advantage. This procedure may be necessary in special cases, but its chief objection will arise when the balance of stock is found to be different from that stated on a bin card. In such instances, and when a difference is frequently shown on the same item of stock, it is desirable that the assistants who have made the respective issues from the particular bin be known with a view to tracing the carelessness to the right individual.

The recording of all items of goods or materials received on the bin cards is important, as also the issues from stock. With small concerns the former may be done from a goods received book or sheet, but with large firms a separate slip or note will be made out for each consignment. Materials returned from the producing departments as surplus will be entered as a " receipt " from the stores credit note, but those materials which are rejected as unsuitable for manufacturing purposes should not be returned to stores upon a stores credit note, but in place thereof a rejection note will be used. Rejected materials, as distinct from surplus materials, will not be entered on the bin card, but placed on one side to await disposal instructions from the buyer or other official.

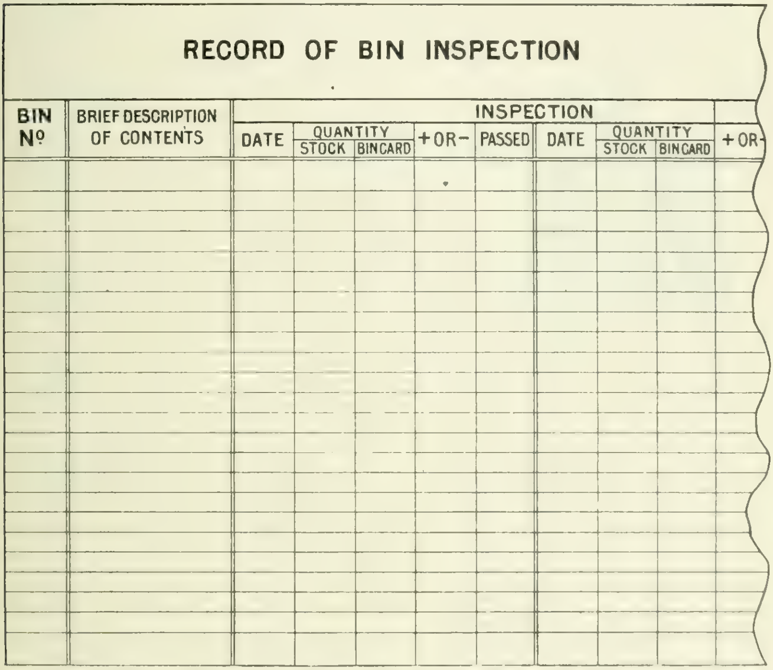
Issues from stores should only be made against a proper authority, namely, a stores requisition, and the quantity or weight entered on the bin card, and the requisition then passed on to the Cost Department.

BIN INSPECTION. It is a very common practice for firms to ignore the many advantages that may be derived from a system of continuous check of stocks, being content to wait for the annual physical stock-taking at the end of each year's trading before the actual value of stores losses and shrinkage is ascertained. This is a practice that cannot be recommended, as errors and discrepancies of various kinds will accrue during the interim period which cannot be easily rectified at so late a date ; for instance, losses due to pilferage, careless handling of stocks, evaporation, obsolescence, etc., will arise.

Furthermore, allowances must also be made in regard to the breaking up of bulk materials for issue in small lots, as would have to be done in the case of a keg of nails, gross packets of screws, rivets, solder, glue, etc., also for the " turn of the scales " when weighing out sheet, bar, and strip metals, etc.

It may sometimes be the practice to include among the establishment expenses an arbitrary amount to cover the above losses, but the fact still remains that any pilferage, carelessness or shrinkage, etc., will continue during the whole year without any form of check or control being exercised by the management. The easiest and most effective method of providing a continuous check upon the various forms of stores losses and shrinkage is to adopt the system of perpetual check of stocks, and a very convenient method is for the storekeeper to check the contents of a fixed number of bins each day so that at least once in each year a physical check of all items in stock will have been made.

Form No. 11.



RECORD OF BIN INSPECTION

BIN Nº	BRIEF DESCRIPTION OF CONTENTS	INSPECTION									
		DATE	QUANTITY		+ OR −	PASSED	DATE	QUANTITY		+ OR	
			STOCK	BINCARD				STOCK	BINCARD		

For this purpose a storekeeper is provided with a book or loose sheets ruled similar to the illustration above, and on which is recorded the results of his daily counts. " The

Record of Bin Inspection," besides being the medium for recording the particulars of each bin as it is checked, also provides a log of all bins, racks, etc., in numerical sequence. Furthermore, by reference to it, one can observe in which items of stock errors most frequently occur. The cause can then be ascertained and suitable action taken.

The duties of the storekeeper and his assistants should be limited to counting the contents of each bin, and the entering on the record of bin inspection the quantity in stock and the quantity shown on the bin card. The record is then sent to the stock record clerk in the Cost Department, who should be the only person authorized to make any alteration on the bin cards should this be necessary.

The result of the actual count is compared with the stock record card, and whenever a difference occurs the detailed entries appearing on the bin card should be checked with those on the stock record card, as it frequently happens that an error is made in bringing down the " balance in stock " figures, or that the storekeeper's assistants have omitted to enter one or more of the issues.

If there is still a discrepancy (after checking and correcting the entries where necessary) it is desirable that the contents of the bin (or bins) be again counted. Any difference will now be corrected, and if an alteration in the bin card is necessitated, this should only be effected by the stock record clerk.

If the nature of the difference is such that the stock record card requires alteration as well as the bin card, it will be necessary to adjust the Stock or Material Control Accounts, and this should be done either weekly or monthly, according to requirements.

It should be noted that the above description relates to the perpetual check of stocks, which should be carried out quite independently of the general scheme of stores organization; for instance, the routine in connection with the replenishing of stocks should be such that whenever an item has reached the "re-order" or "minimum" level, the storekeeper should check the balance of the item in stock before making out his purchase requisition. This method provides an additional check upon the stores and office records, as the purchase requisition will be sent to the stock record clerk, who checks and then initials the requisition before it is passed on to the Purchasing Department.

" BLICK-UNIVERSAL " JOB COSTING CLOCK. The " Blick-Universal " job costing clock, of which a small illustration is inset, represents a simple and efficient equipment for securing accurate labour cost records. The recorder takes any size of card or sheet, and it can be adapted to register in practically any position desired.

The one advantage claimed by the makers of this machine is its adaptability, because by reason of its construction it is quite an easy matter to eliminate or transpose the different wheels, and also, where it is desired to install a decimal system of costing, to fit the necessary engraved wheels for this purpose.

BONUS EARNINGS—RECORD OF. (See PREMIUM OR BONUS EARNINGS: RECORD OF.)

BONUS FOR GOOD TIMEKEEPING. A bonus is very often paid to the workpeople in order to encourage good time-keeping, and the expense incurred in this direction is charged to the factory expenses. In those cases where departmental rates are used for recovering expenses, the amount paid in bonus should be allocated to each of the factory departments.

Bonuses paid to members of the office staff should be allocated to the administrative and selling expenses.

BONUS ON OUTPUT. The amount of bonus paid on output to the works manager or other factory officials is dealt with by either of the following methods—

1. When the bonus paid varies in amount with each class of product, it is a direct charge to each class, but in those cases where such products are being continuously made throughout the year it is then usual to charge the bonus to a special account, and apportion the amount over the whole output for the period.

2. A general bonus paid on the whole output of a factory may more conveniently be charged to the factory expense.

As the object of a bonus on output is to reward the factory officials for increased output, it is more correct to calculate such bonus as a rate per article, per operation, or per process, and not as a percentage rate upon the factory cost of the output. With this latter method an increase in cost may bring about an increase in bonus, although the quantity of articles produced may be less, conversely a reduction in cost brought about by improved methods and increased output would reduce the amount of bonus. It will be seen, therefore, that a bonus on output, and calculated as a rate per article or operation, etc., should be co-related to the prime or factory cost.

BOOKING TIME TO JOBS. The principal requirement of cost accountancy is accuracy, and any system must have for its foundation a reliable source of information.

In almost every instance the checking and analysing of the " time spent on the job " can only be done successfully by the aid of mechanical time recorders. When the process method of cost finding is used, it may not always be possible to allocate or analyse each man's time with the same degree of accuracy as with the job costing method, as a worker may be engaged upon two or more operations at the same time, and in the majority of these cases his time can only be apportioned over the respective jobs.

In the chemical industry, for instance, a worker will often be in charge of several mixers or grinders, and his time cannot be definitely booked to each job or batch of work going through the several machines.

The method that will be used by any concern for booking time to jobs, operations or individual products will obviously differ in each case as the nature of the product, the method of payment, and the general scheme of works organization will each require consideration before a detailed system can be evolved.

The principles underlying the variety of methods that are used can be grouped under the following headings—

Method No. 1. Combined Job and Gate Card—each worker provided with only one card for the pay week, and on which is recorded the times he enters and leaves the factory, also the time " on " and " off " each job.

Method No. 2. Combined Job and Gate Card—each worker provided with only one card for the pay week as with Method No. 1, but in addition there is used a master card for summarizing the labour cost of all the workers engaged on each job or order.

Method No. 3. Combined Job and Gate Card—each worker being supplied with a separate card for each job or order on which he is engaged throughout the pay week. The times spent on each job and as shown by each card are entered on a summary in order to ascertain the total time for the pay week.

Method No. 4. Separate Gate Card and Job Cards—each worker provided with a separate job card for each job or order on which he is engaged.

Method No. 5. Separate Gate Card and One Job Card for Week—each worker supplied with only one job card for use through the pay week.

Method No. 6. One Job Card for Each Order—one job card used per job or order when a series of standard operations are performed, used either with or without a gate card.

Method No. 7. Combined Job Card and Machine Running Card—one job card per machine tool per week for analysing operator's time to each job, which also shows "time on production" and "idle time" of each machine tool.

Method No. 8. Booking Time Direct on Works Instruction Sheet or Work Ticket.

The choice of any of the above methods will depend upon the three points already mentioned, and one will usually find that two or more of the methods will be used by the same factory.

When selecting the most suitable method or methods, it is sometimes necessary to classify the work that has to be performed; for instance, in most cases indirect workers will usually require a different method to direct workers; furthermore, the classification of direct workers may also show that a particular department will require a different method to the remainder.

Having selected the correct basic principle for the particular factory, the designing of a suitable card will depend upon the method of remunerating the workers, also whether instructions regarding the work that has to be performed will be contained on a separate instruction sheet or work ticket or combined with the job card.

Many other matters will require careful consideration, depending upon the nature of the trade which is being carried on, but the above few remarks will be sufficient to indicate the more important factors that must be examined when selecting and installing a time booking system for the job or process methods of cost finding.

(For a detailed consideration of the above methods of booking time, see BOOKING TIME TO JOBS—METHODS OF.)

BOOKING TIME TO JOBS—METHODS OF. (See also BOOKING TIME TO JOBS.) The number of methods which are available for analysing the times spent by each worker upon a job, operation or process is so great that it is only possible to deal with the subject in dictionary form by classifying the methods into their principal groups and by giving only one example of each group. The actual method best suited for any particular factory will entirely depend upon the nature of the industry being carried on, the general scheme of works organization and production control, also the method or methods by which the workers are remunerated. Therefore the description of the various methods given below are only intended to serve as an explanation of the principles underlying each group rather than to indicate the only way each method can be employed.

The variety of methods are classified into two main groups—

Group I, consisting of those methods that make use of a combined gate card and job card ; and

Group II, comprising the methods that require the use of separate job cards, the " in " and " out " times being recorded at the " gates," and the time " on " and " off " each job recorded in the respective departments.

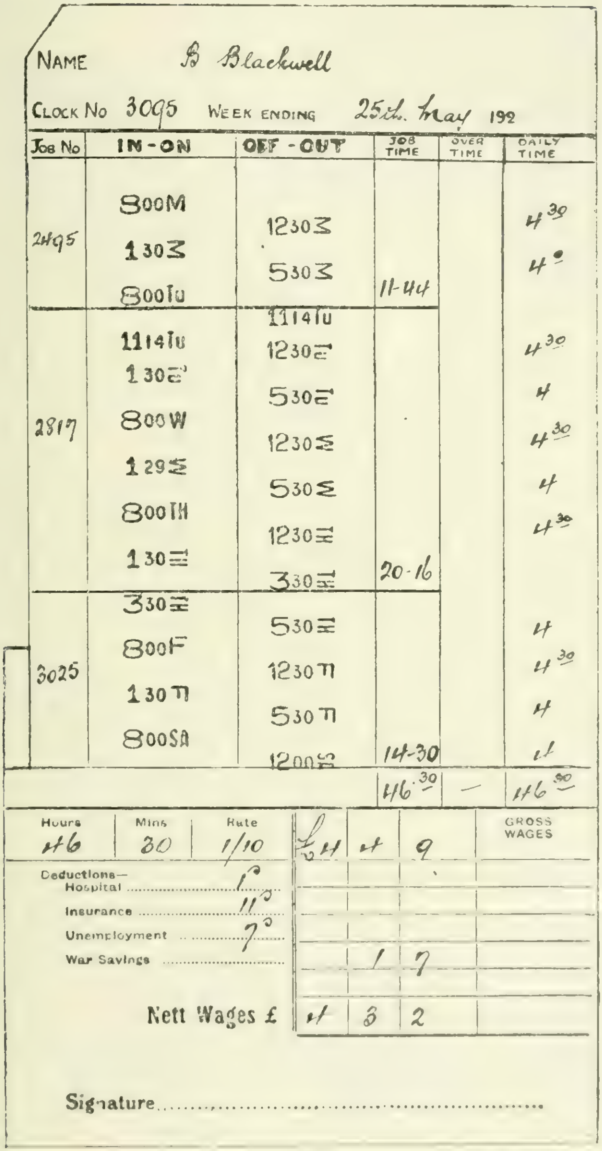
GROUP I

Method No. 1. Combined Job and Gate Card. With this method each worker is supplied with a combined job card and gate card for each pay week. The card is ruled similar to Form No. 12, and upon each worker entering or leaving the factory premises, mornings, midday, and evenings, they clock " in " and " out " respectively, and so provide a record of attendance as would be done if separate gate cards had been used.

When commencing work upon a job the job or works order number is inserted in the left-hand column, and the worker clocks " on " and either retains his card or places it in a " Jobs in Progress " card rack. On completion of the task the worker clocks " off," and the process is repeated for each job throughout the week.

The times on each job can be extended either daily or at the end of the pay week, and in those cases where a job is unfinished at the end of the week, the time is shown separately at the foot of the card and the figure transferred to the summary which appears on the back of the new week's card and entered in a " Brought Forward " column. The time worked on this particular job during the next week is then entered in the column " This Week," and should the job be finished during this second week the two figures are added and the total entered in the " Jobs Finished " column. In those cases where a job may extend beyond this second week the total time is shown in the " carried forward " column

Form No. 12.



NAME *B Blackwell*

CLOCK No *3095* WEEK ENDING *25th. May* 192

JOB No	IN-ON	OFF-OUT	JOB TIME	OVER TIME	DAILY TIME
2495	800M				
		1230Σ			4^{30}
	130Σ				
		530Σ			4^{0}
	800Tu	1114Tu	11-44		
2817	1114Tu	1230⫤			4^{30}
	130⫤				
		530⫤			4
	800W	1230≨			4^{30}
	129≨	530≨			4
	800Th	1230Ξ			4^{30}
	130Ξ	330Ξ	20-16		
3025	330Ξ	530Ξ			4
	800F	1230Π			4^{30}
	130Π	530Π			4
	800SA	1200≘	14-30		4
			46^{30}	—	46^{30}

Hours	Mins	Rate				GROSS WAGES
46	30	1/10	£4	4	9	

Deductions— Hospital .... 1^{d}				
Insurance .... 11^{d}				
Unemployment .... 7^{d}				
War Savings		1	7	
Nett Wages £	4	3	2	

Signature...

and transferred to the next week, and so on until the work *is* completed, when the final total is entered in the " Jobs Finished " column.

The total time on each job is entered in the fourth and fifth columns, whereas the daily time is entered in the column on the extreme right of the card.

The method is very simple and inexpensive to work, and should give very good results in those cases where long runs are made on a particular operation or process or where jobs are completed by one man, but when several workers are engaged upon the one job it is desirable that the times of the respective workers be summarized on to a " Cost Summary Sheet " in order that the direct labour cost can be easily and quickly obtained.

If times are extended each day, the total time spent on each job can easily be ascertained. In large concerns using this method the time recorders should be located in each department.

Method No. 2. Combined Job and Gate Card. This method is similar to No. 1 above, but the ruling of the card, Form No. 13, allows for the time " in " and " out " to be recorded in a separate column to the starting and finishing times of the job.

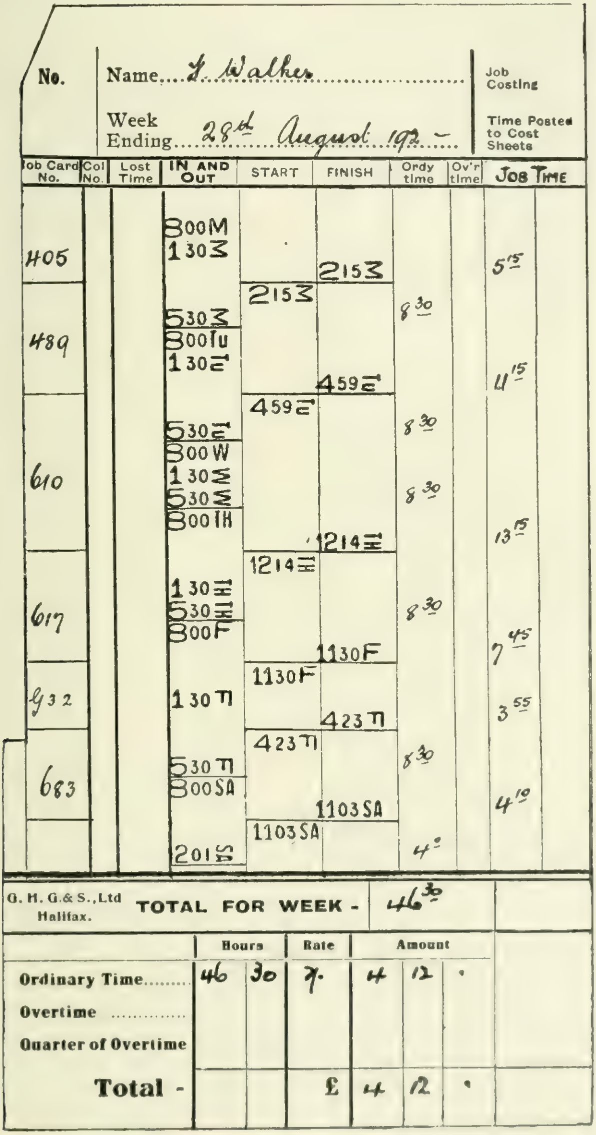
With this method it is usual for a work ticket, similar to Form No. 14, to be issued containing instructions as to the nature and quantity of the work to be done.

As each worker enters or leaves the factory, they clock " in " or " out," as the case may be, in column No. 4, in just the same manner as described for Method No. 1. The registering of the times " on " and " off " each job will also be done as detailed above, but in this instance the works order number as shown on the work ticket is inserted in column No. 1, and the time " on " will appear in column No. 5. Upon completion of the job the worker clocks " off " in column No. 6, and the same process is repeated throughout the week for each works order. At the end of the pay week the total time as shown by column No. 4, which represents the attendance at the factory, is extended into columns Nos. 7 and 8, and the total amount of pay ascertained and the summary at the foot of card completed.

The times spent on each job are extended either daily or weekly into columns Nos. 9 and 10, and the totals for each works order number posted to a job cost summary sheet.

Unfinished jobs are dealt with in a slightly different manner to that described for Method No. 1, and instead of a " brought

Form No. 13.



No.

Name... J. Walker

Week Ending... 28th August 192 –

Job Costing

Time Posted to Cost Sheets

Job Card No.	Col No.	Lost Time	IN AND OUT	START	FINISH	Ordy time	Ov'r time	JOB TIME	
405			8 00 M 1 30 M		2 15 M			5 15	
489			5 30 M 8 00 Tu 1 30 Tu	2 15 M	4 59 Tu	8 30		11 15	
610			5 30 Tu 8 00 W 1 30 W 5 30 W 8 00 Th	4 59 Tu	12 14 Th	8 30 8 30		13 15	
617			1 30 Th 5 30 Th 8 00 F	12 14 Th	11 30 F	8 30		7 45	
932			1 30 F	11 30 F	4 23 F			3 55	
683			5 30 F 8 00 SA	4 23 F	11 03 SA	8 30		4 10	
			2 01 SA	11 03 SA		4 0			

G. H. G. & S., Ltd Halifax. **TOTAL FOR WEEK** - 46 30

	Hours		Rate	Amount		
Ordinary Time.........	46	30	2.	4	12	•
Overtime						
Quarter of Overtime						
Total -			£	4	12	•

Form No. 14 (front).

WORK TICKET

Order No.	Description of Order.	Moved after Inspection by

Description of Part.	Operation.	Operation No.

At Machine.	Moved for Inspection to	After Inspection Move to	After Moving as Instructed Return this Ticket to Progress Department.

Form No. 14 (*back*).

WEEK ENDING……………………………………………………

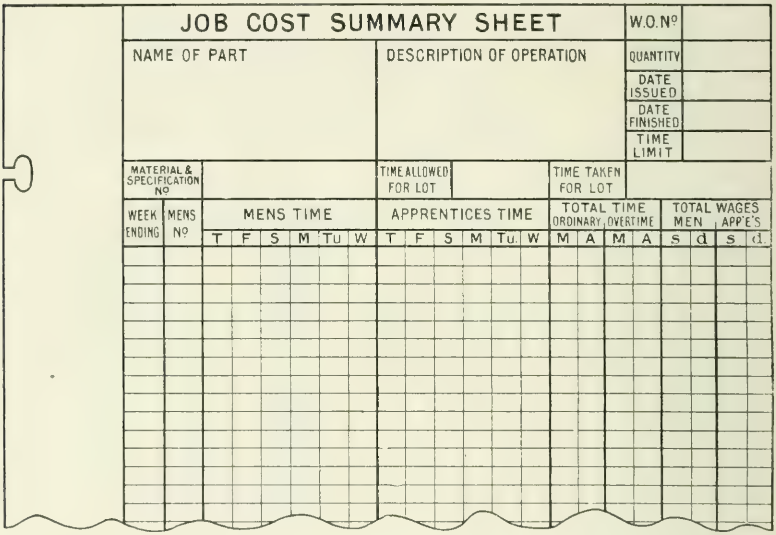
Quantity Passed.					Quantity Rejected.	Date.	Examined by

WORKER'S NAME.	No.

forward " item appearing on the card (Form No. 13) the part time is posted to the job cost summary sheet, together with the other times as shown on the specimen summary Form No. 15.

This method is specially suitable in all cases where a worker has a long run on a particular operation and in the manufacture of more or less standardized articles. If, therefore, a works sub-order is issued for each operation on a quantity of articles instead of one order for the quantity of completed articles, this method provides an easy and inexpensive means of collecting the times of each worker on the respective operations.

Form No. 15.



JOB COST SUMMARY SHEET — W.O. Nº

NAME OF PART

DESCRIPTION OF OPERATION

QUANTITY

DATE ISSUED

DATE FINISHED

TIME LIMIT

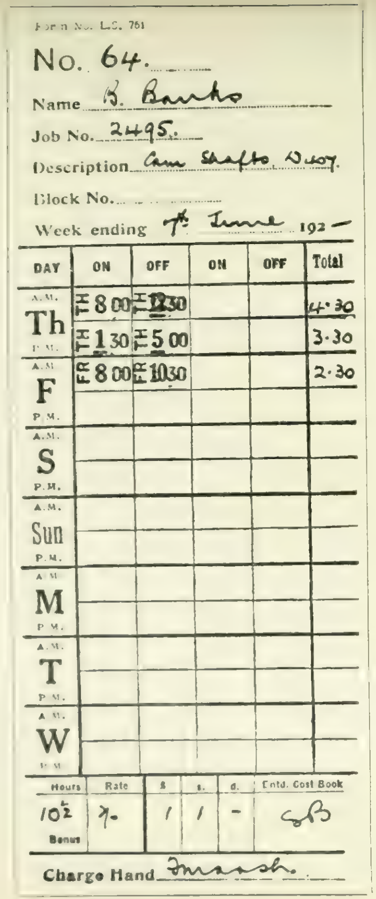
MATERIAL & SPECIFICATION Nº

TIME ALLOWED FOR LOT

TIME TAKEN FOR LOT

WEEK ENDING	MENS Nº	MENS TIME						APPRENTICES TIME						TOTAL TIME ORDINARY		OVERTIME		TOTAL WAGES MEN		APP'E'S	
		T	F	S	M	Tu	W	T	F	S	M	Tu.	W	M	A	M	A	s	d	s	d.

Method No. 3. Combined Job and Gate Card. This method requires the use of one card for each job during the week, the total weekly bonus being obtained by entering on a summary the total hours of each job card. A specimen card is shown, Form No. 16, from which it will be noted that workman No. 64 commenced work on job No. 2495 at 8 a.m. on Thursday, and upon leaving and entering the factory at midday he used the same card for recording his " in " and " out " times and also when leaving at night and again on entering on Friday morning. His work on job No. 2495 being



Form No. L.S. 751

No. 64.

Name B. Banks

Job No. 2495.

Description Cam Shafts D207.

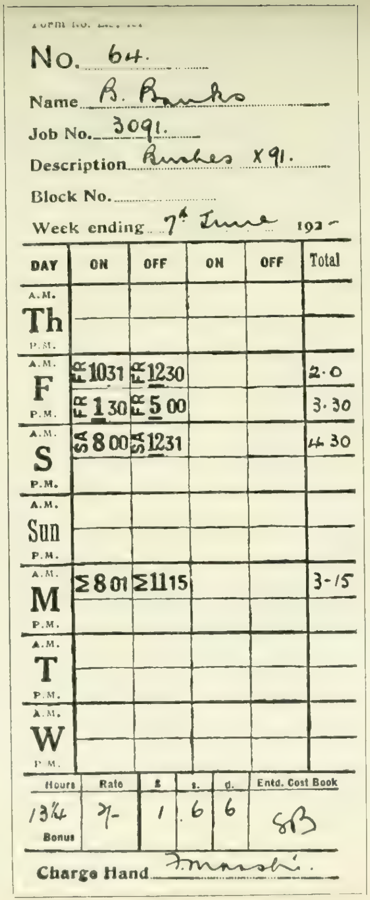
Block No.

Week ending 7th June 192–

DAY	ON	OFF	ON	OFF	Total
Th A.M.	TH 8 00	TH 12 30			4·30
Th P.M.	TH 1 30	TH 5 00			3·30
F A.M.	FR 8 00	FR 10 30			2·30
F P.M.					
S A.M.					
S P.M.					
Sun A.M.					
Sun P.M.					
M A.M.					
M P.M.					
T A.M.					
T P.M.					
W A.M.					
W P.M.					

Hours	Rate	£	s.	d.	Entd. Cost Book
10½	7-	1	1	-	SB
Bonus					

Charge Hand F. Marsh.



No. 64.

Name B. Banks

Job No. 3091.

Description Bushes X91.

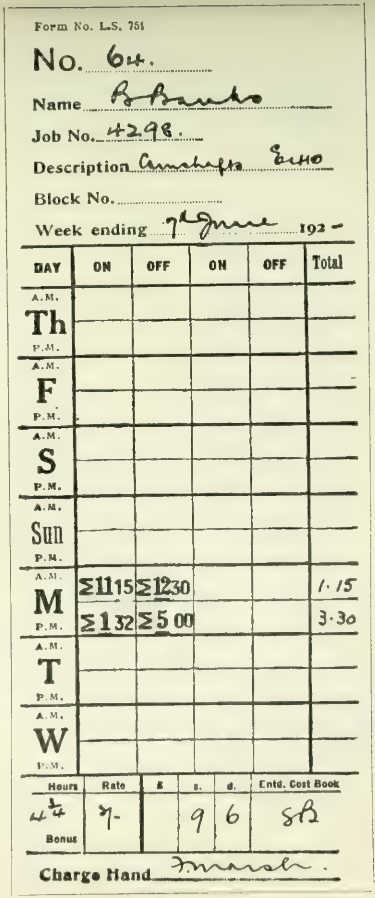
Block No.

Week ending 7th June 192–

DAY	ON	OFF	ON	OFF	Total
Th A.M.					
Th P.M.					
F A.M.	FR 10 31	FR 12 30			2·0
F P.M.	FR 1 30	FR 5 00			3·30
S A.M.	SA 8 00	SA 12 31			4 30
S P.M.					
Sun A.M.					
Sun P.M.					
M A.M.	M 8 01	M 11 15			3-15
M P.M.					
T A.M.					
T P.M.					
W A.M.					
W P.M.					

Hours	Rate	£	s.	d.	Entd. Cost Book
13¼	7-	1	6	6	SB
Bonus					

Charge Hand F. Marsh.



Form No. L.S. 751

No. 64.

Name B. Banks

Job No. 4298.

Description Camshafts E140

Block No.

Week ending 7th June 192–

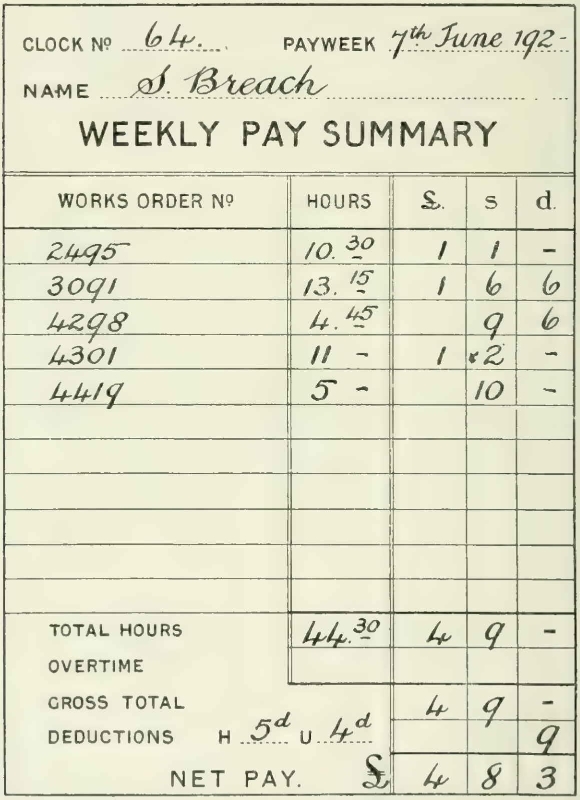
DAY	ON	OFF	ON	OFF	Total
Th A.M.					
Th P.M.					
F A.M.					
F P.M.					
S A.M.					
S P.M.					
Sun A.M.					
Sun P.M.					
M A.M.	M 11 15	M 12 30			1·15
M P.M.	M 1 32	M 5 00			3·30
T A.M.					
T P.M.					
W A.M.					
W P.M.					

Hours	Rate	£	s.	d.	Entd. Cost Book
4¾	7-		9	6	SB
Bonus					

Charge Hand F. Marsh.

finished at 10.30 a.m. Friday, he clocks "off" the old card and "on" to a new card, Form No. 17, which quotes the works order number for his next job, i.e. No. 3091. This procedure is repeated each day, and on completion of the second job registers his time "off" the job and "on" to the next, Form No. 18, and so on throughout the pay week.

Form No. 19.



CLOCK Nº 64. PAYWEEK 7th June 192-

NAME S. Breach

WEEKLY PAY SUMMARY

WORKS ORDER Nº	HOURS	£.	s	d.
2495	10.30	1	1	-
3091	13.15	1	6	6
4298	4.45		9	6
4301	11 -	1	2	-
4419	5 -		10	-
TOTAL HOURS	44.30	4	9	-
OVERTIME				
GROSS TOTAL		4	9	-
DEDUCTIONS H 5d U 4d				9
NET PAY. £		4	8	3

During the week the cards of the completed jobs are passed into the Cost Department and sorted into order of clock number or names of workers, and the times entered upon a weekly pay summary ruled similar to Form No. 19. At the end of the pay week, which will be Thursday in the example chosen, all the cards relating to jobs still in progress are collected and the total times spent on the unfinished jobs ascertained and entered upon the summary. These cards may then be returned to their racks for use during the next week, as new cards need only be issued for jobs in progress when all the space has been used. Alternatively, a new card can be issued for the new pay week.

The advantage of this method lies chiefly in the direction of convenience in having the " in " and " out " times on the same card as the " on " and " off " times of each job, as in such cases reference to other cards is unnecessary when ascertaining whether a worker was absent, came in late, or left early during the period of any job.

GROUP II

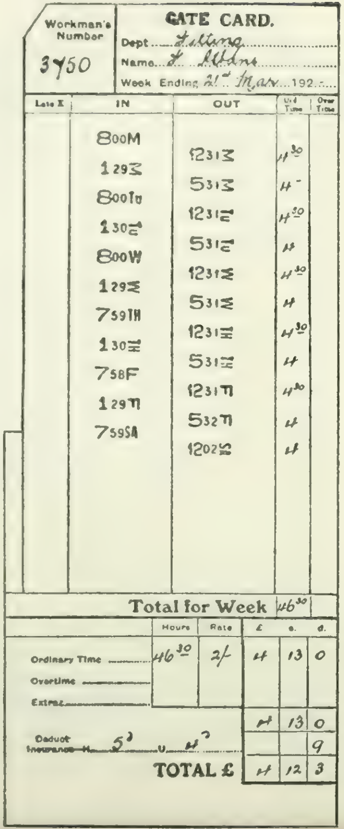
Method No. 4. A Gate Card and a Separate Job Card for Each Task on which the Worker is Engaged. This is a method that is very commonly used for ascertaining the labour cost of both direct and indirect work, because it is possible to vary the details of the system by departments or sections, when found necessary, and without affecting the routine of the remaining departments.

In the case of large factories it may be necessary to install two sets of time recorders, as the routine in connection with the booking of time to jobs, etc., will be carried out quite independently of the attendance times which may be recorded at the gates. In the case of the job cards, it will usually be desirable that time recorders be installed in each department or other suitable position, so that the actual process of time recording can be carried out expeditiously and under strict supervision.

The procedure in regard to the booking of the " in " and " out " times at the " gates " must be arranged to suit the special conditions of each factory, but whichever system is adopted it can generally be arranged in such a manner that the routine in connection with the job cards is worked independently up to the point where the total times spent on the various jobs is compared and checked with the total time as shown on the gate cards.

The specimen forms, Nos. 20, 21, and 22, clearly indicate the method, each worker registering his " in " and " out " times on the gate card, and the start and finish of each job on separate job cards. As each job is finished the job card is sent to the Cost Department, where all are extended, checked, and temporarily sorted either by clock number or

Form No. 20



GATE CARD.

Workman's Number 3750

Dept. Fitting

Name F. Albans

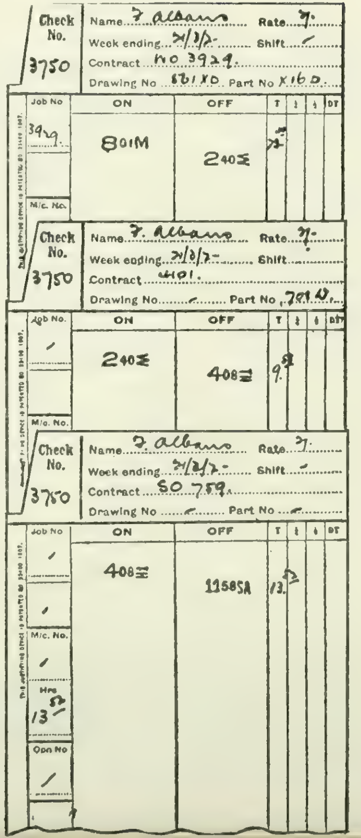
Week Ending 21st Mar. 192-

Late X	IN	OUT	Ord. Time	Over Time
	8 00 M	12 31 M	4^{30}	
	1 29 M	5 31 M	4^{-}	
	8 00 Tu	12 31 Tu	4^{30}	
	1 30 Tu	5 31 Tu	4	
	8 00 W	12 31 W	4^{30}	
	1 29 W	5 31 W	4	
	7 59 TH	12 31 TH	4^{30}	
	1 30 TH	5 31 TH	4	
	7 58 F	12 31 F	4^{30}	
	1 29 F	5 32 F	4	
	7 59 SA	12 02 SA	4	

Total for Week 46^{30}

	Hours	Rate	£	s.	d.
Ordinary Time	46^{30}	2/-	4	13	0
Overtime					
Extras					
			4	13	0
Deduct ~~Insurance~~ H. 5^{d} U. 4^{d}					9
TOTAL £			4	12	3

Form No. 21.



Check No. 3750

Name F. Albans Rate 7.

Week ending 21/3/2- Shift -

Contract No 3929.

Drawing No 861 XD Part No X16 D.

Job No	ON	OFF	T	¼	½	DT
3929.	8 01 M	2 40 W	[illegible]			
M/c. No.						

Check No. 3750

Name F. Albans Rate 7.

Week ending 21/3/2- Shift

Contract 4101.

Drawing No - Part No 701 U.

Job No.	ON	OFF	T	¼	½	DT
-	2 40 W	4 08 TH	9^{58}			
M/c. No.						

Check No. 3750

Name F. Albans Rate 7.

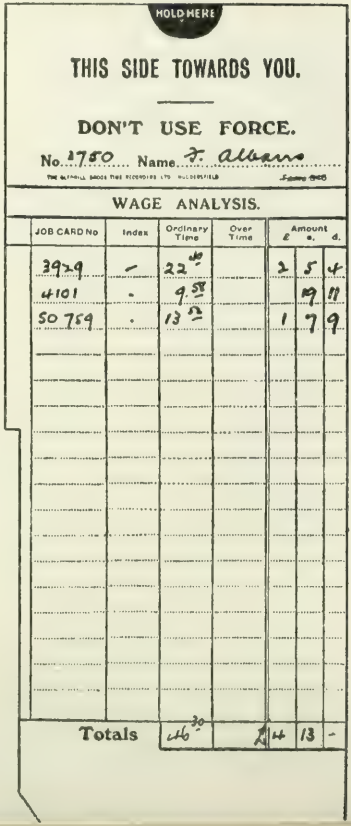
Week ending 21/3/2- Shift -

Contract 50 759.

Drawing No - Part No -

Job No	ON	OFF	T	¼	½	DT
-	4 08 TH	11 58 SA	13^{52}			
-						
M/c. No. -						
Hrs 13^{52}						
Opn No -						

Form No. 22.



HOLD HERE

THIS SIDE TOWARDS YOU.

DON'T USE FORCE.

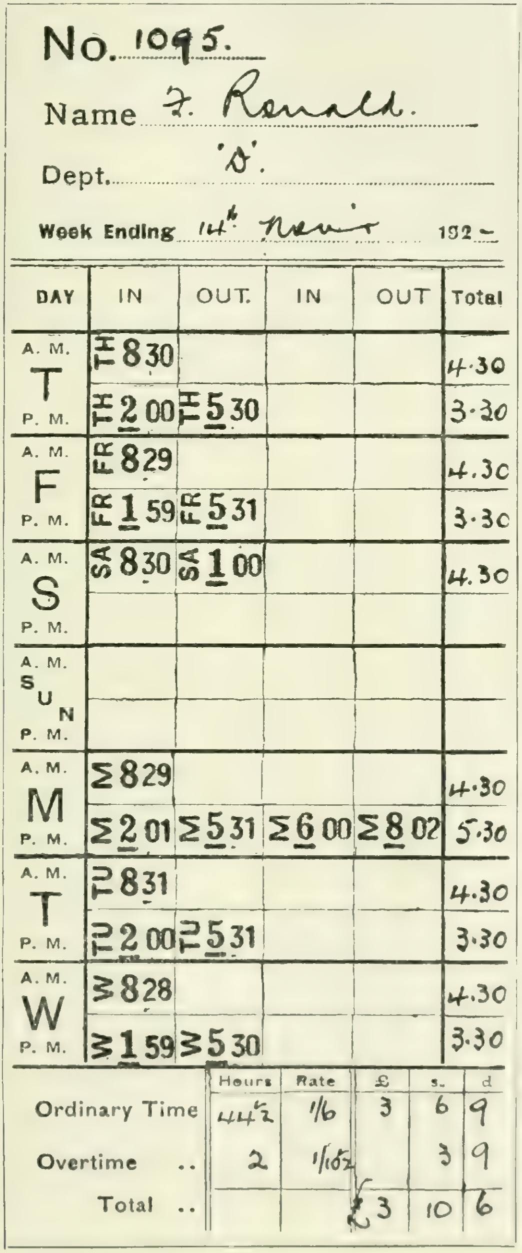
No. 3750 Name F. Albans

WAGE ANALYSIS.

JOB CARD No	Index	Ordinary Time	Over Time	Amount £	s.	d.
3929	-	22^{40}		2	5	4
4101	.	$9.^{58}$			19	11
50 759	.	13^{52}		1	7	9
Totals		46^{30}		£4	13	-

Form No. 23.

GATE CARD



No. 1095.

Name F. Ronald.

Dept. 'D'.

Week Ending 14th Nov 192–

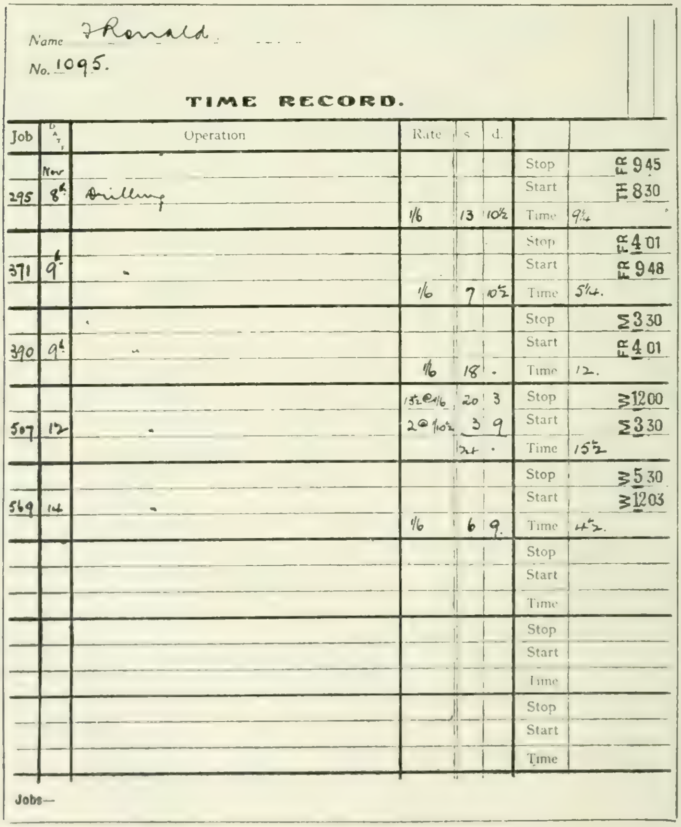
DAY	IN	OUT.	IN	OUT	Total
A. M. T	TH 8 30				4·30
P. M.	TH 2 00	TH 5 30			3·30
A. M. F	FR 8 29				4.30
P. M.	FR 1 59	FR 5 31			3·30
A. M. S	SA 8 30	SA 1 00			4.30
P. M.					
A. M. SUN					
P. M.					
A. M. M	M 8 29				4·30
P. M.	M 2 01	M 5 31	M 6 00	M 8 02	5·30
A. M. T	TU 8 31				4·30
P. M.	TU 2 00	TU 5 31			3·30
A. M. W	W 8 28				4·30
P. M.	W 1 59	W 5 30			3·30

	Hours	Rate	£	s.	d
Ordinary Time	44½	1/6	3	6	9
Overtime ..	2	1/10½		3	9
Total ..			£3	10	6

worker's name. At the end of the pay week the gate cards are collected (being replaced with new ones) and the "in" and "out" times extended and totalled as shown on Form No. 20. The back of this card is ruled so that all of the job cards can be summarized thereon and the times booked to the various jobs agreed with the total time as shown on the gate card. (Form No. 20.)

When this method is used for work on service orders, each job card may be ruled off and used again during the following weeks until filled up. Similarly, the last card used by direct workers on a works order may be ruled off and returned to the worker, who continues with the card until the job is finished. Alternatively, a fresh card is issued for all jobs in progress at the end of each pay week.

Form No. 24. **JOB CARD**



Name F Ronald
No. 1095.

TIME RECORD.

Job	Date	Operation	Rate	s.	d.		
	Nov					Stop	FR 9 45
295	8th	Drilling				Start	TH 8 30
			1/6	13	10½	Time	9¼
						Stop	FR 4 01
371	9th	-				Start	FR 9 48
			1/6	7	10½	Time	5¼.
						Stop	≥ 3 30
390	9th	-				Start	FR 4 01
			1/6	18	-	Time	12.
			15½ @ 1/6	20	3	Stop	≥ 12 00
507	12	-	2 @ 1/10½	3	9	Start	≥ 3 30
				24	-	Time	15½
						Stop	≥ 5 30
569	14	-				Start	≥ 12 03
			1/6	6	9.	Time	4½.
						Stop	
						Start	
						Time	
						Stop	
						Start	
						Time	
						Stop	
						Start	
						Time	

Jobs—

Method No. 5. Separate Gate Card and One Job Card per Man per Week. This method is very similar to Method No. 1, and each worker records his "in" and "out" times on a separate gate card. The recording of times on jobs is done independently of the gate cards, as it will usually be desirable to place the time recorders in the departments. Forms Nos. 23 and 24 are given, which show the "in" and "out" times of worker No. 1095 recorded on a gate card, and the starting and finishing times of each job recorded on a job card which remains in use throughout the pay week.

The method may be found useful for small repair shops and in all cases where jobbing work is undertaken. With the larger factory, however, it is not very suitable, as the cost of each job cannot be compiled from day to day.

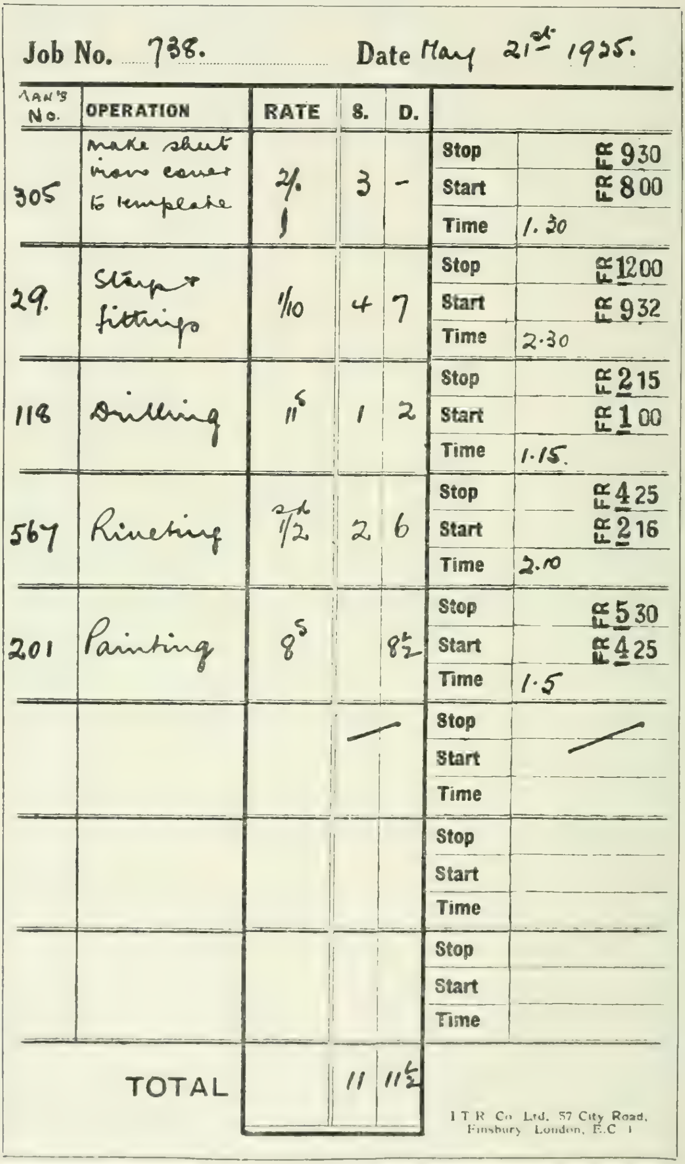
In those cases where this daily costing is not necessary, it still has the objection that the work of summarizing and compiling job costs in the Cost Department is rendered difficult owing to the fact that the record of each worker's time on the various jobs is contained on the one job card. (See Form No. 24.)

Method No. 6. One Job Card per Order. A method that is sometimes used when a series of standard operations are performed on an order and when it is desired to record all the labour costs on the one card. A specimen job card is shown, Form No. 25, from which it will be noted that the workmen performing each of the operations record their time on the card which remains with the order until completed. When the first man has finished his particular task, he (or the foreman according to routine) clocks "off," and the card is sent with the work to the view room. After the first operation has been inspected and passed, the work is issued for the next operation, together with the same job card, and this procedure is followed until completion of the order.

The checking of the times as shown on the gate cards of each worker, with the times spent on each job in order to ascertain whether all time is accounted for, is one of the greatest objections to this method. However, if the process method of cost finding is in operation, a great deal of time is saved when compiling labour costs of the job or process if the one card per job, or series of processes, etc., is used. The method can also be adopted with advantage in certain cases where a system of job costing is in use.

Method No. 7. Combined Job Card and Machine Running Card. The illustration, Form No. 26, shows a job card

Form No. 25.



JOB CARD

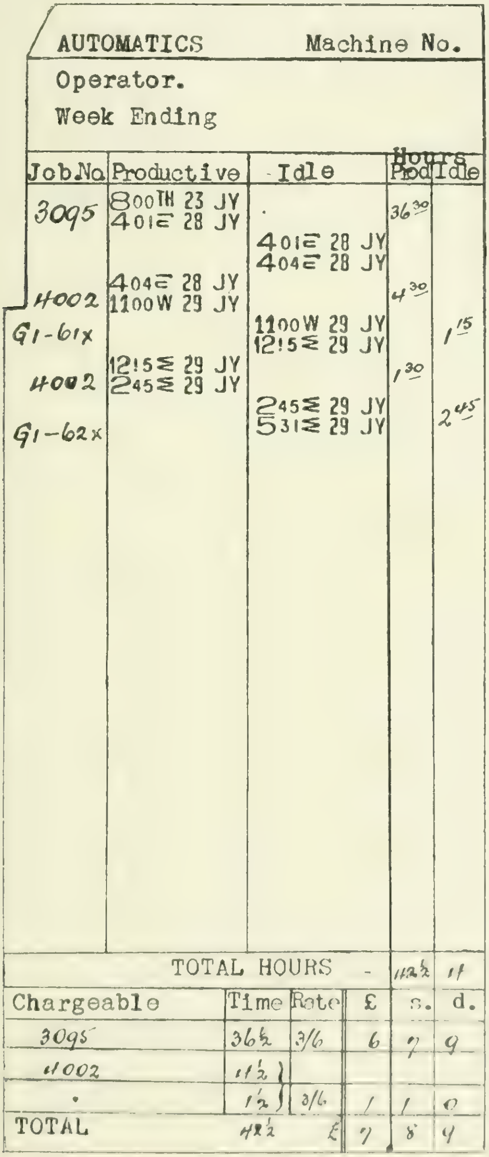
Job No. 738. Date May 21st 1925.

MAN'S No.	OPERATION	RATE	S.	D.		
305	make sheet iron cover to template	2/.	3	-	Stop	FR 9 30
					Start	FR 8 00
					Time	1.30
29.	Strap & fittings	1/10	4	7	Stop	FR 12 00
					Start	FR 9 32
					Time	2·30
118	Drilling	11d	1	2	Stop	FR 2 15
					Start	FR 1 00
					Time	1.15.
567	Riveting	1/2	2	6	Stop	FR 4 25
					Start	FR 2 16
					Time	2.10
201	Painting	8d		8½	Stop	FR 5 30
					Start	FR 4 25
					Time	1·5
					Stop	
					Start	
					Time	
					Stop	
					Start	
					Time	
					Stop	
					Start	
					Time	
	TOTAL		11	11½		

I T R Co. Ltd. 57 City Road,
Finsbury, London, E.C. 1

Form No. 26.

MACHINE RUNNING CARD



AUTOMATICS Machine No.

Operator.

Week Ending

Job No.	Productive	Idle	Hours Prod	Hours Idle
3095	800TH 23 JY 401≡ 28 JY		36³⁰	
		401≡ 28 JY 404≡ 28 JY		
4002	404≡ 28 JY 1100W 29 JY		4³⁰	
G1-61x		1100W 29 JY 1215≷ 29 JY		1¹⁵
4002	1215≷ 29 JY 245≷ 29 JY		1³⁰	
G1-62x		245≷ 29 JY 531≷ 29 JY		2⁴⁵
TOTAL HOURS		-	42½	4

Chargeable	Time	Rate	£	s.	d.
3095	36½	3/6	6	7	9
4002	4½				
•	1½	3/6	1	1	0
TOTAL	42½	£	7	8	9

arranged to record the time a machine tool is occupied on each order. The cards are operated in much the same manner as for Method No. 5, the mechanic or foreman clocking " on " and " off " when starting and finishing each job. If a breakdown or delay occurs, the job is registered " off " and the machine registered (on the same card) on to a service or standing order, according to the nature of the breakdown or delay, and when the machine or work is ready, the standing order number is checked " off " and again " on " to the job ; likewise, if a fresh job is not ready immediately the last order is completed, the machine is clocked " on " to a standing order.

By this means the idle time of each machine tool is collected on the same card. However, a separate idle machine card may be used if desired.

On referring to Form No. 26, it will be observed that job No. 3095 was commenced at 8 o'clock on Thursday and completed at 4 p.m. Tuesday. Job. No. 4002 commenced at 4.4 p m. same day and, owing to a breakdown occurring on the Wednesday, the machine was idle from 11 a.m. to 12.15. On completion of this job, Wednesday, at 2.45 p.m., the machine was again idle for the remainder of the day, due to a shortage of material.

The method is specially suitable in certain cases where a more or less standardized output obtains, and where a mechanic attends to two or more machines, the object being to time the machines rather than the worker.

Method No. 8. Booking Time Direct on to the Works Instruction Sheet or Work Ticket. With some of the above methods it is not possible to give full particulars of the work to be performed on the job cards, consequently a work ticket must be used and in certain instances the time spent on each job can quite conveniently be recorded on the same form. This method is particularly suitable for small and in some cases large repair shops, garages, and where the same man completes the one job. A specimen work ticket is given, Form No. 27, which is sufficient to indicate how the method is operated in the case of a repair shop. The work tickets are collected in just the same manner as is done with job cards, and the total times summarized as described for Method No. 3

BOUGHT OUT SUPPLIES—REJECTION OF. (See GOODS RECEIVED: REJECTION OF.)

BRANCH STORES. (See STORES ORGANIZATION AND LAYOUT, also STORES TRANSFER NOTE.)

Form No. 27.

WORK TICKET

Date Issued *16th June* 192

Workman's Name *G. Williamson*

No. *375* Dept. *Repair*

DESCRIPTION OF WORK.

Generally overhaul ignition and lighting system.
Car YZ 3095.

Order No. *2901*

Elapsed Time *2.51*

RATE.	AMOUNT.
2/-	*- : 5 : 9*

STOP.

June 10, 192 *9.47*

START.

June 10, 192 *6.56*

APPROVED— *H. G. Harris* Foreman.

BROKERAGE AND COMMISSION ON ISSUE OF NEW SHARES. All expenses incurred in regard to the issue of shares, etc., are a direct charge to Profit and Loss Account, and the amount is not included in the cost accounts.

BUILDINGS—DEPRECIATION OF. The amount of depreciation on buildings forms part of establishment expenses, and the item allocated to the factory, selling, and administrative sections of the business on the basis of space occupied. The extent of this analysis will be determined by the method used for recovering expenses in costs, as when departmental rates are employed the amount of depreciation relating to the factory will necessarily require further analysis. (See also Depreciation.)

BUILDINGS—REPAIRS AND MAINTENANCE OF. The total cost of repairing and keeping in good order all premises is ascertained by charging all the expenditure to a Buildings Repairs and Maintenance Account, and the total is then allocated either arbitrarily or by direct analysis to the respective Factory and Office Departments.

The expense of building repairs may either be obtained by means of a system of service orders or allocated direct, as in the case of small concerns.

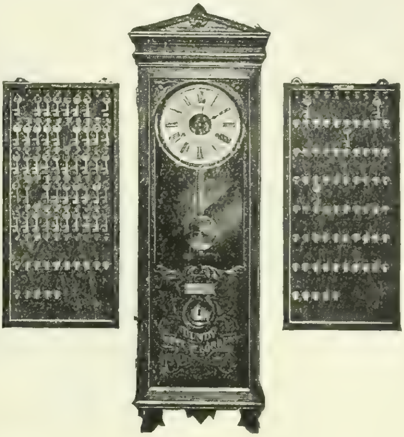
When a system of service orders is in use, the expense should be analysed by departments where possible ; alternatively, and when the factory consists of several separate buildings, the practice is to allocate the expense to each building.

In the latter case the total cost of repairs for the period is apportioned over the respective departments, according to the cubic area occupied. When a machine rate is used for recovering factory expenses in costs, the amount of repairs and maintenance of each department may be further analysed to each machine tool or group of machines on the basis of space occupied.

When dealing with machine rates, it is often a convenience if such items as lighting, rates, repairs and maintenance, etc., be grouped and apportioned as one total on the above basis. (See Repairs and Maintenance and Service Orders.)

BUNDY KEY TIME RECORDER. The capacity of this type of time recorder is unlimited, and during the 24 hours any number of records can be made by any number of employees.

The numbered keys are hung on hooks on boards at either side of the recorder, one board being for " in " and the other for " out." To register, each employee takes his numbered key and inserts it in a keyhole in the recorder. A printed impression is thus made on a paper tape inside the recorder of the hour, minute, and the distinctive number of each employee. The records thus appear in chronological order, so that the records of late arrivals are automatically grouped together. In order to make an analysis of time, these late records are made a note of, the absentees are noted by their keys remaining on the "out" board, and the remainder of the numbers are simply ticked off as being present and early.



BURDEN. (See Establishment Expenses.)

BURGLARY INSURANCE. The amount of the premiums paid in connection with the insurance of stocks against burglary forms part of the establishment expenses of a business, and its treatment in costs will depend upon whether one cares to regard this item as a general administrative charge or a charge against the stores.

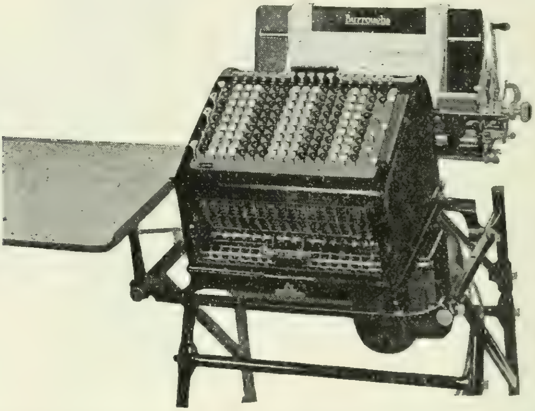
In the case of the latter, the expense will require to be separated, so that both the stocks of raw materials and finished parts, etc., and merchanted stocks are each charged with their correct proportion.

The insurance premiums on stocks of materials held for manufacturing purposes will, therefore, be charged to factory expenses or Material Expense Account, whereas the premiums on saleable stocks may be charged to selling and distribution expenses if the Sales Department are responsible for such stocks.

In the majority of cases the cost of burglary insurance is usually allocated direct to administrative expense. (See also Fire Insurance.)

THE BURROUGHS PAY ROLL AND COSTING MACHINE. The use of machinery in connection with the writing up of pay rolls is a decided advantage where a large number of men are employed, and especially when an analysed form of pay roll is used.

Various styles of machines are available for pay roll and costing purposes ; for instance, style 2700, listing and adding up to a maximum capacity of 17 columns in each of two counters, is a machine which is equipped with an unlimited split device, so that the 17 columns can be " split " or divided into several columns, representing the various items to be incorporated in a pay roll.



Burroughs Listing and Adding Machine (Style No. 2700)

The carriage of the machine is motor driven and controlled entirely from the keyboard. No attention is required from the operator to ensure correct tabulating, as movements from column to column are absolutely automatic.

Only five operations are necessary to list a full line of 11 columns, and for the carriage to return automatically to the first printing position for the next line.

First, in column No. 1, the workman's number is printed and automatically non-added.

Second, items in columns Nos. 2 to 4 are listed and added simultaneously in separate sections of one set of adding dials.

Third, the item in column No. 5 is listed, but not added.

Fourth, items in columns Nos. 6 to 8 are listed, but not added.

Fifth, items in columns Nos. 9 to 11 are listed and added simultaneously in separate sections of the second set of adding dials.

When the listing of wages and deductions for all workmen is completed, the machine has already accumulated the totals of columns Nos, 2, 3, and 5, so the three separate totals are printed at one time. It also has accumulated the totals of columns Nos. 9, 10, and 11; these totals are similarly printed. Columns Nos. 5, 6, 7, and 8 are then added and totals printed in their proper columns to complete the pay roll.

BUYER — SALARY OF. The salary paid to the buyer or purchasing agent forms part of the establishment expenses of a business, and the treatment in the cost accounts of this item will depend upon the manner in which all expense incidental to the purchasing and handling of materials is dealt with. In those cases where such expenses are segregated from those which relate solely to production, the expenses of the Purchasing Department, and which include the salary of the buyer, will be

Check No.	STATE INSURANCE.		Gross Wages.	DEDUCTIONS FROM WAGES.				STATE INSURANCE		Net Wages.
	Company's Contributions.			Bank	Thrift Club	Xmas Club	National Savings Certificates.	Employees.		
	Sickness.	Unemployment.						Sickness.	Unemployment.	
			*							*
278	5	10	4. 0. 5		6	2	2. 6	5	9	3.16. 1 :
279	5	10	3.17. 11	2. 6	6	2		5	9	3.13. 7 :
280	5	10	3.18. 9		6	2		5	9	3.16. 11 :
281	5	10	4.16. 0	2. 6		2		5	9	4.12. 2 :
282	5	10	4 1. 0		6	2	2. 6	5	9	3.16. 8 :
283	5	10	3. 6. 7		6	2		5	9	3. 4 9 :
	30	60	24. 0. 8 *	5. 0 *	30	12	5 0 *	30	54	23. 0. 2 *

FORM 28.—REDUCED FACSIMILE OF PAY ROLL COMPILED ON A BURROUGHS PAY ROLL AND COSTING MACHINE

allocated to a Materials Handling Expense Account, and the total of this expense item recovered in costs as a percentage on the value of materials consumed in production.

With most concerns, however, the expenses of purchasing and storekeeping, etc., are included among establishment expenses and allocated to the Factory Departments, but in those cases where a merchanting as well as manufacturing business is carried on, the expense of the Purchasing Department should be charged to the Factory and Selling Departments either on the basis of the value of purchases made or arbitrarily apportioned, according to the extent it is estimated each section of the business benefits by the activities of this department.

It must be noted that when a merchanting business is also carried on, the expense of storekeeping and material handling, etc., should be dealt with separately from the expenses of purchasing, as the basis of allocation or apportionment in such cases may more correctly be the value of stocks or merchandise held rather than the value of purchases made on account of the fact that merchandise may be shipped direct to customers or re-dispatched the same date as received.

BUYING DEPARTMENT—EXPENSES OF. The total expenses of the Buying or Purchasing Department will form part of the establishment expenses of a business, and treatment of this item in the cost accounts will depend upon the manner in which all expenses incidental to the purchasing and the handling of materials are dealt with. The general practice may be considered under two headings, i.e. (1) the total of the above expenses is segregated from those which relate solely to production and allocated to a Material Handling Expense Account, and the amount recovered in cost separately as a percentage on the value of materials consumed in production ; and (2) the total expense is not separated from the other items of establishment expense, but included with the factory and/or selling expense rate.

In those cases where a merchanting business as well as manufacturing is carried on, it will be necessary with either of the above methods to apportion the amount over the Factory and Selling Departments.

With regard to (1) the expense of storekeeping and material handling, etc., should be dealt with separately from those items which relate solely to purchasing, as the apportionment is effected on two different bases.

The expenses of the Purchasing Department are allocated to the Factory and Selling Departments either on the basis of the value of purchases made or arbitrarily apportioned, according to the extent it is estimated these two sections of the business benefit by the activities of this department.

In regard to storekeeping and material handling expenses, however, it is more equitable to allocate this item on the basis of the value of stocks or merchandise held rather than the value of purchases made, on account of the fact that merchandise may be shipped direct to customers or re-dispatched the same date as received.

With regard to (2) the expense of the Buying Department is included amongst the establishment expense and allocated to the Factory Expense and Selling Expense Account on the basis of the value of purchases made, i.e. merchanted goods and materials, etc., or direct to factory expenses if no merchanting business is carried on.

For a detailed consideration as to the treatment of material handling expense, see under that heading.

BUYING—ROUTINE OF. (See PURCHASING.)

BY-PRODUCT COSTING. By-products arise in most of the continuous process industries, and the apportionment of the expenditure incurred between the main product and the by-product at the point when the latter is separated from the former, presents one of the greatest difficulties in connection with process costing.

A manufacturing process may proceed up to a certain stage, when the liquid solid or gas which is being dealt with becomes divided or formed into two or more distinct products.

Up to the point of this separation no difficulty is experienced in recording the cost of the process, as the total expenditure is chargeable to the process or one product. Immediately a separation takes place, however, it is necessary to apportion the cost over the two or more products.

It is only in very exceptional cases that the expenditure relating to a by-product can be definitely measured or allocated to it, consequently logical apportionment must be resorted to in the majority of instances.

The basis of apportionment may be the sales or market price of the main product and by-product, the yield or arbitrary values assigned to the products at the time the separation occurs.

The choice of a basis will generally be determined by the sales value of the by-products, as it is not desirable that a considerable amount of clerical work be undertaken when a by-product can only be disposed of at, say, a few shillings per ton. On the other hand, the by-products may have a fairly high market value, and in such cases a more accurate but reasonable apportionment should be made.

In order to indicate the general principles of by-product costing it is necessary to pre-suppose a given set of conditions, and with this in view a description of a system applicable to the costing of coke with its several by-products is given.

Metallurgical coke is the result of the distillation of coal which, being put into airtight ovens, heated, and the gases driven off, leaves a solid matter, composed of carbon, ash, sulphur, and phosphorus, which is known as coke.

The gases driven off are taken into coolers and condensed, and the primary by-products extracted from the volatile matter. These are tar, ammonia, benzol, and gas. After the gases are drawn from the ovens by the exhausters, the tar is condensed, which leaves the ammonia and benzol to be extracted in the saturators and scrubbers respectively at a proper temperature. The gas which is left is returned to the ovens for heating purposes, or sold through gas mains to consumers.

This brief description of coal distillation is given to show that in installing a system of costing into a coking plant, it should be of such an elastic composition to meet any extensions which might be made to further distillation of the by-products, as such products as tar and benzol can be further subjected to distillation and valuable by-products recovered.

Raw Material—Coal. When the coal comes in from the various collieries, it should be weighed, and particulars, weight, colliery, together with particulars of coal consumed, dirt washed out, stocks of coal in trucks or bunkers, and daily quantity of coal received should be sent every morning to the Cost Department by the traffic manager.

The weigh cabin should be situated so that all incoming and outgoing traffic will pass this point, allowing everything to be weighed and accounted for. On the traffic manager should rest the responsibility of always having a constant supply of empty wagons and a proper stock of coal in hand.

The coal after being weighed should be teemed, washed, and put into storage bunkers, and when ready for use is conveyed to the crushers to be ground into a fine state before it is charged into the ovens.

Classification of Control Letters and Accounts. In installing a system of cost accounts an extensive and elastic system of control letters, which will absorb all direct and indirect charges in a proper and automatic manner, is necessary.

Direct charges, such as wages and materials, can be allocated by charging direct to the product concerned, leaving the indirect expenses to consist of as small a proportion as possible.

Wages, materials, and expenses can be allocated directly to the various by-products by giving a control letter to these products, but the indirect items should be given a control letter which in turn will be spread over the products using them, according to the use made of them. Stores, wages, and materials which cannot be allocated against any definite control letter, will be dealt with on the same basis. Below is given a list of control letters and classification of accounts which should absorb all costs incurred in a coke and by-product plant of average size—

(*a*) Coal handling plant.
(*b*) Coal carbonizing.
(*c*) Coke manufacture.
(*d*) By-products (general).
(*e*) Tar manufacture.
(*f*) Sulphate of ammonia.
(*g*) Benzol.
(*h*) Naphthalene.
(*i*) Gas.
(*j*) Tar distillation.
(*k*) Oils (general).
(*l*) Green oil and anthracene paste.
(*m*) Creosote.
(*n*) Pitch.
(*o*) Boilers.
(*p*) Locomotives.
(*q*) Tar plant cleaning.
(*r*) River pumps.
(*s*) Repairs and Maintenance Department.
(*t*) Plant Expense Account.
(*u*) General Expense Account.

(*a*) Coal Handling Plant. General labour directly connected with washery, drainage, bunkers, crushers, elevators, and crushed coal bunker, water pipe line from tank to washer, work on washery ponds, platelayers, working on washer roads, etc., also stores and machinery will be booked to this control letter.

(*b*) Coal Carbonizing. All machinery, stores, and work connected with the following: Chargers (including bunker slides), cranes, rams, brickwork on ovens, all mains, valves, and pipe work in cellars as far as benzol scrubbers, change over gear, pug-mills, and stacks.

(*c*) COKE MANUFACTURE. To include all machinery, stores, and general labour directly connected with benches, conveyors, pipes, rails, pumps, etc., relating to quencher ; screens and pipe line from tank to ovens, also platelayers working on coke roads will book their time, etc., to this letter.

(*d*) BY-PRODUCTS (GENERAL). To include all ascension pipes, tar mains, and gas mains from ovens to tar sprays, connecting, but not including, tar sprays, saturators (in sulphate house), naphthalene coolers, and benzol scrubbers ; exhausters, all steam pipes connected with steaming out of the above. Main pipe line from boilers to by-product end, tar circulating pumps and pipe work connected with same, gas compressors, repairs to railway tanks, any work generally connected with pump house. Platelayers working on tar plant road to book under this letter. Any work connected with by-products, but not definitely connected with any one by-product, to be booked under this letter.

(*e*) TAR MANUFACTURE. All work and materials used in connection with tar sprays and connections from same to and including liquor and tar storage tanks (in well only), tar spray pumps and pipe work connected with same, and steam pipes connected with above.

(*f*) SULPHATE OF AMMONIA. Apparatus for emptying acid tanks, all steam pipes in sulphate house, and liquor tank, tower, and pipe line from tar plant to lime-stills. All plant, stores, and work connected with sulphate house, including acid storage, saturators, liquor pumps, lime-stills, air compressors, and all pipe work connected with above. Any general labour directly connected with above to be booked under this letter.

(*g*) BENZOL. All plant, stores, and work in regard to benzol house, wash oil coolers, wash oil pumps, and wash oil storage tanks ; benzol storage tanks, scrubbers, apparatus for filling benzol tanks, creosote pipe line from tar plant, water pipe line to wash oil coolers, all steam pipes connected with above.

(*h*) NAPHTHALENE. All plant, time, and materials used for surface coolers, naphthalene spray coolers, naphthalene storage houses, steam pipes connected with above, water pipe line to cooler, and pumps for same.

(*i*) GAS. To include all stores, work and plant, gas holder, meter, regulating valves, and gas main from scrubbers to gas holder.

(*j*) Tar Distillation. All work and stores connected with tar storage tanks and pipe work to tar plant, washing tanks, settling tanks, feed tanks, feed pump heaters (but not including coils), stills (not including pitch cooler), gas pipe from exhauster house, flues, etc.

(*k*) Oils (General). Still head pipes and coils in heaters, condensers, test boxes, and connections to and including storage tanks, steam pipes connected with above. Any work connected with oils, but not definitely connected with anthracene or creosote, to be booked under this letter.

(*l*) Green Oil and Anthracene Paste. All stores and work connected with agitating tanks, settling tanks, wells, pumps, strainers, whizzers, anthracene paste storage house, green oil storage tank, and steam pipes connected with above.

(*m*) Creosote. All work and stores on towers, settling pans, apparatus for filling barrels, creosote storage tanks, and steam pipes connected with above.

(*n*) Pitch. Pitch coolers, pipe lines, and connections from same to pitch beds, also time of platelayers working on permanent way to pitch beds.

(*o*) Boilers. Brickwork, feed pumps, feed water heaters, boiler valves, and mountings, water pipe line to same.

(*p*) Locomotives. All work and stores connected with locomotives and locomotive shed.

(*q*) Tar Plant Cleaning Out. All work and stores used in cleaning out of tar plant.

(*r*) River Pump. All machinery, stores or work in connection with river pumps, including pipes, lines, valves, etc., connecting and including tank

(*s*) Repairs and Maintenance Department. Stores or work such as cleaning offices, painters, carmen, stables and cartshed, cleaning men's cabins, etc., and which cannot be allotted to any of the other control letters, also any repairs to the fittings in joiners', electricians' and fitting shops, repairs to trucks, cleaning up yard, lighting of yard, repairs to offices, etc., and platelayers on main roads.

Account Classification. The total expenditure incurred by each of the departments making a definite product is easily ascertained by the use of the following classification of accounts and very little explanation will be needed in regard to accounts (*a*), (*c*), (*e*), (*f*), (*g*), (*h*), (*i*), (*l*), (*m*), (*n*) and (*q*). With regard to the remainder, and which relate to departments or work of a semi-direct nature, the expenditure in each case is allocated over the direct manufacturing accounts ((*a*) to (*q*) above) on a percentage basis or other more convenient method. A suggested method of allocation is given against accounts (*b*), (*d*), (*j*), (*k*), (*o*), (*p*), (*r*), (*s*), (*t*), and (*u*), but in view of the variation in the design of coke oven plants, the method used in actual practice must be determined according to the special conditions of each plant.

(*a*) COAL HANDLING PLANT (WASHERY)—

1. Coal.
2. Direct labour (permanent).
3. Labour (repairs, maintenance, etc.).
4. Material and supplies.
5. Energy and locomotives.
6. Water (river pump).
7. Depreciation (buildings and equipment).
8. Plant expenses (office, stores, and laboratory, etc.).
9. General expenses (insurances, rates, etc.).

(*b*) COAL CARBONIZING ACCOUNT—

1. Coal carbonized.
2. Direct labour (permanent).
3. Labour (repairs and maintenance).
4. Material and supplies.
5. Energy.
6. Gas returned to ovens.
7. Depreciation (machinery, equipment, and stacks).
8. Plant expenses (offices, stores, laboratory, etc.).
9. General expenses.

(*Note.* This account is absorbed by Coke and By-products proportionately, according to yields.)

(*c*) COKE MANUFACTURE—

1. Proportionate part of Coal Carbonizing Account.
2. Direct labour (permanent).
3. Labour (repairs and maintenance).
4. Materials and supplies.
5. Energy and locomotives.
6. Water (river pump).
7. Depreciation (machinery and equipment).
8. Plant expenses (office, stores, laboratory, etc.).
9. General expenses.

(*d*) BY-PRODUCTS (GENERAL)—

1. Direct labour (permanent).
2. Labour (repairs and maintenance).

(*d*) BY-PRODUCTS (GENERAL)—*contd.*

3. Material and supplies.
4. Energy.
5. Steam.
6. Depreciation (plant and machinery).
7. Plant expenses (offices and stores).
8. General expenses.

(*Note.* This account is absorbed by the By-products, Tar, Benzol, Ammonia, Naphthalene, and Gas proportionately, according to yields.)

(*e*) TAR MANUFACTURE—

1. Proportionate part of Coal Carbonizing Account.
2. Proportionate part of By-products (General) Account.
3. Labour (repairs and maintenance).
4. Material and supplies.
5. Steam.
6. Depreciation (plant and machinery).
7. Plant expenses (offices, stores, etc.).
8. General expenses.

(*f*) SULPHATE OF AMMONIA—

1. Proportionate part of Coal Carbonizing Account.
2. Proportionate part of By-products (General) Account.
3. Direct labour (permanent).
4. Labour (repairs and maintenance).
5. Materials and supplies.
6. Energy and locomotives.
7. Steam.
8. Sulphuric acid.
9. Lime (lime-stills).
10. Depreciation (plant, machinery, and buildings).
11. Plant expenses (offices, stores, laboratory, etc.).
12. General expenses.

(*g*) BENZOL—

1. Proportionate part of Coal Carbonizing Account.
2. Proportionate part of By-products (General) Account.
3. Direct labour (permanent).
4. Labour (repairs and maintenance).
5. Materials and supplies.
6. Energy and locomotives.

(*g*) BENZOL—*contd.*

7. Steam.
8. Absorbent oil.
9. Water (river pump).
10. Depreciation (plant, machinery, and buildings).
11. Plant expenses (offices, stores, laboratory, etc.).
12. General expenses.

(*h*) NAPHTHALENE—

1. Proportionate part of Coal Carbonizing Account.
2. Proportionate part of By-products (General) Account.
3. Direct labour (permanent).
4. Labour (repairs and maintenance).
5. Materials and supplies.
6. Water (river pump).
7. Steam.
8. Depreciation (plant and machinery).
9. Plant expenses (offices, stores, laboratory, etc.).
10. General expenses.

(*i*) GAS—

1. Proportionate part of Coal Carbonizing Account.
2. Proportionate part of By-products (General) Account.
3. Labour (repairs and maintenance).
4. Materials and supplies.
5. Depreciation (plant).
6. Plant expenses (offices, stores, laboratory, etc.).
7. General expenses.

(*j*) TAR DISTILLATION—

1. Tar distilled at cost price of tar manufacture.
2. Direct labour (permanent).
3. Labour (repairs and maintenance).
4. Proportionate cost of tar plant cleaning out (on per day basis).
5. Materials and supplies.
6. Energy.
7. Gas to tar plant.
8. Steam.
9. Depreciation (plant and machinery).
10. Plant expenses (offices, stores, laboratory, etc.).
11. General expenses.

(*Note.* This account is absorbed by Oils (General) Account and Pitch Account in proportion to their yields.)

(*k*) OILS (GENERAL)—

1. Proportionate part of tar distillation cost.
2. Direct labour (permanent).
3. Labour (maintenance and repairs).
4. Materials and supplies.
5. Steam.
6. Depreciation (plant and machinery).
7. Plant expenses (offices, stores, laboratory, etc.).
8. General expenses.

(*Note.* This account is absorbed by Green Oil and Anthracene Paste Account and Creosote Oil Account, according to yields.)

(*l*) GREEN OIL AND ANTHRACENE PASTE—

1. Proportionate part of Oil (General) Account.
2. Direct labour (permanent).
3. Labour (maintenance and repairs).
4. Materials and supplies.
5. Energy and locomotives.
6. Steam.
7. Depreciation (plant and machinery).
8. Plant expenses.

(*m*) CREOSOTE OIL—

1. Proportionate part of Oil (General) Account.
2. Maintenance and repairs.
3. Depreciation (plant and equipment).

(*n*) PITCH—

1. Proportionate part of tar distillation.
2. Labour (pitch bed men).
3. Labour (repairs and maintenance).
4. Materials and supplies.
5. Locomotives.
6. Depreciation (pitch beds).
7. Plant expenses (offices, stores, laboratory, etc.)
8. General expenses.

(*o*) BOILERS—

1. Fuel.
2. Water.
3. Direct labour (permanent).
4. Labour (repairs and maintenance).
5. Materials and supplies.
6. Depreciation (boilers, buildings, and stacks).

(*o*) Boilers—*contd.*

7. Plant expenses (offices, stores, etc.).
8. General expenses.

(*Note.* This account may be absorbed by Benzol 25 per cent, Tar Distillation 30 per cent, By-products (General) 2½ per cent, Tar Manufacture 5 per cent, Sulphate of Ammonia 20 per cent, Naphthalene 2½ per cent, Oils (General) 5 per cent, and Green Oil and Anthracene Paste 10 per cent.)

(*p*) Locomotives and Main Permanent Ways—

1. Coal.
2. Water.
3. Direct labour (permanent).
4. Labour (repairs and maintenance).
5. Materials and supplies.
6. Depreciation (locomotives and sheds).
7. Depreciation (permanent way).
8. Plant expenses (offices and stores).
9. General expenses.

(*Note.* This account may be absorbed by Coal Handling 40 per cent, Coke 30 per cent, Benzol 10 per cent, Sulphate of Ammonia 5 per cent, Green Oil 5 per cent, and Pitch 10 per cent.)

(*q*) Tar Plant Cleaning Out—

1. Labour.
2. Materials and supplies.
3. Supervision.

(*Note.* This account is gradually absorbed by Tar Distillation.)

(*r*) River Pump—

1. Labour.
2. Labour (repairs and maintenance).
3. Materials and supplies.
4. Depreciation (buildings, pumps, and pipe lines).
5. Plant expenses (offices, stores, etc.).
6. General expenses.

(*Note.* This account is absorbed by Coal Handling 25 per cent, Coke 25 per cent, Naphthalene 30 per cent, and Benzol 20 per cent.)

(*s*) REPAIRS AND MAINTENANCE DEPARTMENT—

1. Labour (general).
2. Material and supplies.
3. Energy.
4. Heating and lighting.
5. Tools.
6. Depreciation (buildings).
7. Depreciation (plant and machinery).
8. General expenses.
9. Salaries and superintendence.

(*Note.* Transferred to Plant Expense Account (*t*).)

(*t*) PLANT EXPENSE ACCOUNT (OFFICES, STORES, AND LABORATORY)—

1. Wages and salaries (permanent).
2. Miscellaneous supplies and expenses.
3. Depreciation (buildings).
4. Depreciation (furniture and fittings).
5. General expenses.
6. Repairs and Maintenance Department (transfer).

(*Note.* This account is absorbed by Washery, Coke, and all By-products.)

(*u*) GENERAL EXPENSE ACCOUNT (INSURANCE, RATES, ETC.)—

1. Administrative salaries.
2. Rents and rates.
3. Insurance.
4. Directors' fees and expenses.
5. Travelling expenses.
6. Printing and stationery.
7. Postages and telephones.
8. Advertising.
9. Audit charges.
10. Canteen expenses.
11. Bad debts.
12. Bank charges and interest, etc.

(*Note.* This account is absorbed by Washery, Coke, and all By-products.)

Timekeeping. As productive and non-productive labour is employed, there are two methods of computing time, by shift and by hours. All shift work time should be kept by the foreman and checked weekly with clock cards, while datal

Form No. 29.

CONSUMPTION ACCOUNT

CLEAN COALS.

	T.	C.	Price.	£	s.	d.	T.	C.	£	s.	d.
STOCK ON______192____											
In Wagons											
On Ground											
Coals Received as per Return.											
STOCK ON______192____											
In Wagons											
On Ground											
Less Coals used in Offices, etc.											
Coals used on Locomotives											
Coals used at Boilers. .											
COALS TEEMED .											
*Add*_____Tons lifted at____per Ton, which were Cast at											
________per Ton											
________per Ton Labour . .											
Less Dirt Washed Out . . .											
NET CLEAN COALS TO BUNKERS.								£			

COALS CARBONIZED.

	T.	C.	Price.	£	s.	d.	T.	C.	£	s.	d.
STOCK ON________192____											
Drainage Bunkers											
Crushed Coal Bunkers . . .											
Washery Settling Ponds . .											
Clean Coals put up (including Washery Coal)											
STOCK ON________192____											
Drainage Bunkers											
Crushed Coal Bunkers . . .											
Washery Settling Ponds . .											
COALS CARBONIZED								£			

GAS TO OVENS
__________ C. F. at_______per 1,000 cubic ft. — £___________

SULPHURIC ACID.

	T.	C.	Price.	£	s.	d.	T.	C.	£	s.	d.
STOCK IN HAND_____19___											
Storage Tanks											
Railway Tanks											
Acid Received											
STOCK IN HAND_____19___											
Storage Tanks											
Railway Tanks											
ACID USED. . .								£			

WASH OIL.

	Galls.	Price.	£	s.	d.	Galls.	£	s.	d.
STOCK IN HAND_____192__									
Scrubbers									
Wash Oil Tanks									
Fresh Oil Tanks									
Spent Oil Tanks									
Wash Oil Received									
From Tar Plant									
Foreign Wash Oil									
STOCK IN HAND ON___192__									
Scrubbers									
Wash Oil Tanks									
Fresh Oil Tanks									
Spent Oil Tanks									
Less Spent Oil to Circulation.									
Spent Oil Dispatched . . .									
WASH OIL USED .						£			

ELECTRIC CURRENT
______Units at______per Unit — £________

GAS TO TAR PLANT
______Cubic Feet at______per 1,000 Cubic Feet — £________

time should be kept by a timekeeper and checked in the same way.

At the end of the week all clock cards and time books should be sent to the Wage Department for entry in the usual way, and an allocation in total of all datal workers' time, with the control letter covering the time spent should be sent to the cost office for costing purposes.

Time lost on shift work should be inquired into as often as possible, as lost time causes disorganization on a coking plant.

Payment of Wages. Wages are paid by the shift of eight hours for overmen and by the hour for datal men. A loose-leaf pay roll should be used, as this allows for the work to go on smoothly and no one is kept waiting until other work is finished. Wages totals should be checked in the usual manner, and wages should not be paid by anyone having made up the wage sheets.

It is customary to issue pay notes to the men employed in ovens. These contain the number of shifts worked, money due (less offtake), and other particulars customary to various districts. These notes can be written out after the wages sheets are finished, or they may be filled in at the same time as the wage sheets are being made up by the use of carbon paper.

Stores and Materials. Stores and materials used in connection with coke oven plants are of a very heavy nature, and a proper system of store handling is necessary. No stores should be issued without a proper stores requisition, and this should state clearly the purpose for which the material is required and the control letter given.

Records of stock should be kept on the card system, a duplicate of which should be kept in the cost office under the supervision of a responsible clerk, who will see that his records of stock on hand (stock record card) agree with the records (bin cards) of the storekeeper. Periodical checks should be taken by actually ascertaining the quantity on hand of any given article, and steps taken to ascertain the cause of any discrepancy. (See BIN INSPECTION.)

Consumable Stocks. To complete recovery of by-products large consumable stocks have to be carried. These stocks should be carefully checked every week to get the amount used in production. Slackness in this matter will often cause more stocks to be consumed than necessary, thus increasing the cost of the by-products.

Production Record. A record of the daily production containing the production of coke, tar, sulphate, benzol, and gas for the previous day should be sent to the cost office. This can be arranged to give what other information is thought to be desired, as it forms the basis for statistical information.

Depreciation and other items of Establishment Expenses. Depreciation on coke oven plants is a heavy item and must be provided for either by a reserve, or by an extensive maintenance equipment. As to what this reserve or equipment should amount to yearly can only be decided by previous experience, but nothing can be lost by keeping the plant in an efficient state of repair.

The monthly establishment expense should be allocated to a General Expense Account (Form No. 30), and the total amount of this monthly charge be debited to the Coke, By-product, and Auxiliary Accounts, according to a pre-arranged percentage or some other method of allocation.

Form No. 30.

………………COLLIERY COMPANY

GENERAL EXPENSE ACCOUNT

Dr. *Cr.*

	£		£
1. Administrative Salaries		By Transfers—	
2. Rents and Rates .		(*a*) Coal Handling .	
3. Insurance . .		(*b*) Coal Carbonizing .	
4. Directors' Fees and Expenses . .		(*c*) Coke Manufacture .	
		(*d*) By-products, General	
5. Travelling Expenses .		(*e*) Tar Manufacture .	
6. Printing & Stationery		(*f*) Sulphate of Ammonia	
7. Postage & Telephones		(*g*) Benzol . .	
8. Advertising . .		(*h*) Naphthalene . .	
9. Audit Charges . .		(*i*) Gas . . .	
10. Dining Room Expenses		(*j*) Tar Distillation .	
11. Bad Debts . .		(*k*) Oils, General. .	
12. Bank Charges and Interest . .		(*l*) Green Oil and Anthracene Paste .	
		(*n*) Pitch . . .	
		(*o*) Boilers . . .	
		(*p*) Locomotives & Main Permanent Ways	
		(*r*) River Pump . .	
		(*s*) Repairs & Maintenance Department	
		(*t*) Plant, Overhead A/c Unabsorbed Overhead . . .	
£		£	

Form No. 31.

MONTHLY COST SHEET
FOR COKE, BREEZE, AND BALLAST

MONTH ENDING..............................19............ ....TONS MADE

	CURRENT MONTH.						THIS YEAR TO DATE.					
	Manufacturing		Maintenance		Total		Manufacturing		Maintenance		Total	
	Amount	Cost per ton	Amount	Cost per ton	Amount	Cost per ton	Amount	Cost per ton	Amount	Cost per ton	Amount	Cost per ton
COKE PRODUCTION COSTS.	£ s. d.	£	£ s. d.	£	£ s. d.	£	£ s. d.	£	£ s. d.	£	£ s. d.	£
Proportionate Part of C.C. A/c.												
Labour, Permanent, Direct												
Labour, Permanent, Indirect												
Labour, Maintenance, Direct												
Labour, Maintenance, Indirect												
Materials and Supplies												
Energy and Locomotives												
Water												
Health and Unempl. Insurance												
Superintendence												
Plant Office Expenses												
Sundry Expenses												
Total Prime Costs												
PLANT EXPENSES.												
Wages, Indirect												
Salaries, Indirect												
Materials and Supplies, Indirect												
Heating and Lighting												
Tools												
General Insurance												
Workman's Comp. Insurance												
Depreciation, Buildings												
Depreciation, Plant & Machinery												
Reserves												
Miscellaneous Supplies & Expns.												
Total of Prime Cost and Plant Expenses												
GENERAL EXPENSE CHARGES.												
Administrative Salaries												
Rent, Rates, and Taxes												
Directors' Fees and Expenses												
Travelling Expenses												
Printing and Stationery												
Postage and Telephones												
Audit Charges												
Dining Room Expenses												
Depreciation, Furniture & Fit'ngs												
Bad Debts												
Bank Charges and Interest												
Office Expenses												
Total of Prime Cost, Plant, and General Expenses												
SELLING EXPENSES.												
Selling Office Exps. and Salaries												
Rent and Other Office Expenses												
Advertising												
Commissions												
Sundries												
Total of Prime Cost, Plant, General, and Selling Expenses for Coke												

Monthly Accounts and Costs. As soon as possible after the end of the month the costs for the preceding month should be commenced upon. All coal received during the month should be compared with the stocks on hand and consumption during the period. Dirt washed out should be ascertained, and as this is a loss, should be added to the price of coal. All expenses should be allocated over the manufacturing accounts, and all costs of whatever nature disposed of. When all charges have been accounted for the manufacturing accounts will show a difference in the debit or credit columns, which will, of course, be a profit or loss.

Monthly cost sheets can now be compiled which will contain all the information in the manufacturing accounts (only in more detail) together with selling expenses. The monthly cost sheet (Form No. 31) should be so designed to show up comparisons in cost between given periods, and should give totals for every distinct part when making up a total cost.

If monthly manufacturing accounts and monthly cost sheets are compiled as suggested, there should be no difficulty in reconciling the Cost or Manufacturing Account with the financial accounts, and every endeavour should be made to do so.

Statistics. Statistics are of much importance in a coke oven plant, and the productive results for the year or for any other given period should be shown. In compiling statistics clearness must be aimed at, so that an immediate grasp of the points brought out can be obtained, and the necessary action taken by those concerned. (See also PROCESS COSTING.)

CARRIAGE. The expenditure incurred both in regard to carriage "outwards" and "inwards" will require to be analysed accordingly, as the former when confined to carriage on goods sold will be a charge to selling expense, and the latter, if restricted to carriage on purchases of materials used for manufacturing purposes, is a charge to "Material Expense" or "Factory Expense" Account.

It will, therefore, be seen that carriage charges of every description will require the most careful analysis, as the practice of charging all the expense incurred in connection with the Sales Department, for instance, to the one account will not serve any useful purpose, in view of the fact that the sundry carriage charges incurred by the Sales Department will include the expense of goods returned by customers for various reasons in addition to the carriage outwards on goods sold.

Likewise the carriage inwards should not all be grouped into the one account, as the expense which relates to the carriage on raw materials required for manufacturing purposes should be segregated from any expense incurred on the return of faulty or rejected materials and for sundry other reasons.

The correct treatment of carriage expenses, the term "carriage" being used as referring to the charges made by railway and other transport companies and to exclude the expenses of any Transport Department, etc., run by the company, will require that a proper system of expense classification be used in order that the sub-accounts will clearly show the incidence of this charge.

The treatment of carriage inwards when solely relating to charges incurred on raw materials for manufacturing purposes, is either a charge to factory expense or, in those cases where a separate Material Handling Expense Account is used, it should be charged to this account.

In those cases where a merchanting as well as manufacturing business is carried on, it will be necessary to segregate the carriage inwards, as the expense of the former is a charge to selling expenses and the latter to the factory.

In regard to carriage outwards, the charges incurred upon goods dispatched to customers will be allocated to selling expenses, and carriage on rejected or faulty materials returned to the supplier should be charged to a separate account, and included in with the factory expense or charged direct to Profit and Loss Account. (See Carriage Inwards and Carriage Outwards.)

CARRIAGE INWARDS. The items charged to this account generally refer to carriage charges made by railway and other transport companies in connection with the transit of materials and goods to the works, and may therefore include carriage on raw materials and merchanted goods, as well as the carriage on goods returned by customers as faulty, etc. In such cases the account will require analysing, as the carriage expense relating to each of the above items will require different treatment as follows—

(*a*) *Carriage inwards on materials required for manufacturing purposes.*

The carriage expense of this class of materials may be dealt with by four different methods according to circumstances—

1. Allocated to factory expenses and recovered in costs with the factory expense rate.

2. Allocated to a Material Handling Expense Account and recovered separately in costs as a percentage on the value of materials consumed on each job, order or process.

3. Added to the purchase price of the materials.

4. Treated as a direct charge.

With the majority of industries the use of both methods 1 and 4 will give the best results, as heavy carriage charges on special materials can easily be charged direct to the job, order or process for which they are required, all the sundry items of carriage being included among the factory expenses. With the very large concerns, however, it may be necessary to use both methods 2 and 4, but it should always be borne in mind that with method 2 an equitable distribution of the material handling expense is only possible when the respective kinds of materials consumed are more or less uniform as regards " value " and " weight " or " bulk " ; for instance, if the material handling expense is distributed as a percentage on the value of materials used on an order or process, the amount added to an order that requires a small quantity of expensive materials, such as brass, copper, gun-metal, or high speed steel, etc., may be as great or even more than the amount added to an order that has consumed a cheaper and heavier class of material, such as castings, etc. In the case of the former the actual " handling " expense may be very much less than the latter on account of the difference in weight and the bulkiness of most castings.

With regard to method 3, this can only be adopted in exceptional cases, and although it may be possible to analyse the carriage expense to the respective consignments, the work entailed may be so great as to render it impracticable. Furthermore, it will invariably be found impossible to apply the carriage charges to all the stores items, as the numerous sundry supplies may be too small so far as the quantity or weight of each item is concerned.

Method 4 is rarely adopted alone, being generally used in addition to one or more of the remaining methods, and whenever this is possible it should be adopted for all items that can be dealt with as a direct charge.

(*b*) *Carriage inwards on merchanted goods.*

Carriage on merchanted goods, i.e. goods on which no work is done but which are resold in the same condition as received, may be dealt with as follows—

5. Allocated to selling and distribution expenses and recovered in costs with the selling expense rate.

6. Added to the purchase price of the goods.
7. Treated as a direct charge.

The choice of any of methods 5 to 7 will depend upon the nature and size of a business; for instance, where the merchanting business is not large and goods are only purchased against a customer's order, the carriage thereon can be treated as a direct charge, but in those cases where a big factoring trade is done, the special circumstances applicable to the business must be considered and the method or combination of methods selected accordingly.

With very large concerns, however, it may be desirable to deal with the expense of handling and storing, etc., of all saleable products by allocating the expense to a Sales Department Material Handling Expense Account in a similar manner to that sometimes done with the storage and handling of materials used by the factory. In such a case the carriage is then charged to this account and or treated as a direct charge whenever possible.

(*c*) *Carriage inwards on faulty, etc., goods returned by customers.*

The charges on this item are dealt with according to the reason why the goods have been returned; for instance, the carriage on goods which are rejected owing to defective workmanship is a charge against the factory, but if the fault is due to defective materials, it is a charge to a special "Service Order," which is finally closed out to Cost of Sales Account or Profit and Loss Account. With small concerns, however, such analysis of this item of carriage may not be necessary and the total is allocated to the one account.

CARRIAGE OUTWARDS. The amount of this account will usually refer to charges made by railway and other transport companies in connection with the transit, etc., of goods to a customer's address, and in all such cases the total of the account forms part of establishment expenses, and is allocated to selling expenses.

With large concerns the account may include carriage charges on faulty materials that have been returned to the suppliers for credit or replacement, and the item will then require to be analysed, but in the majority of instances such expense accounts will be properly classified, and any carriage incurred on faulty materials, etc., will be allocated direct to its correct account.

The inclusion of carriage outwards among the factory expenses is not recommended, inasmuch as the charge does not accrue until the goods have been sold. Furthermore, carriage outwards is more correctly a charge to selling expenses. When a company runs its own transport service, the expense will require special treatment, as described under "Transport Costs."

CASH DISCOUNTS. (See DISCOUNTS ALLOWED and DISCOUNTS RECEIVED.)

CATALOGUES—COST OF. The expense incurred in the printing, etc., of catalogues may sometimes be charged in the accounts to advertising expenses or analysed as a separate item. This expense should be dealt with upon the same principle as advertising expenses, and any specially large expense incurred in connection with the marketing of new products should be regarded as a direct charge to the cost of those products or the amount spread over a definite period.

The expense of general advertising and literature, etc., is best dealt with by being allocated direct to selling expenses.

CHAIRMAN'S FEES. The fees paid to the chairman of the board of directors form part of the establishment expenses of a business and are allocated to administrative expense.

CHARGEABLE EXPENSES. (See DIRECT EXPENSES.)

CHECKING OF COSTS. (See COST CONTROL ACCOUNTS.)

CLASS COST METHOD OF COST FINDING. The class cost method of cost finding is a term that is often used to denote the job costing method when applied to the costing of goods by classes instead of the unit or piece. In place of the "cost" being separately compiled for each article or piece of machinery, the cost will cover a group of orders of the same class of product. Whilst the job covers the "class" instead of the "piece" we still have the job costing method, but with a different unit of output to that usually associated with the more general form of job costing.

The use of the class cost method is, therefore, confined to those industries where the various kinds of articles made are capable of classification into groups, owing to their similarity both as regards materials and the process of manufacture.

The products of a foundry when limited to small or "light" castings are often conveniently grouped into classes, according to weight and each class costed separately. For instance, castings of 1 lb. and under may be classified into one group; 1 to 3 lb. into group two, and 3 to 5 lb. into group three, and so on. The cost of each class is ascertained and the total weight produced divided into the cost of each group or class to give a cost per pound. This rate is then used for pricing the individual lots which comprise each class. By such means all castings which come within the limits of each group are costed as one lot instead of preparing separate costs for the individual castings. (See also COST FINDING—METHODS OF, and JOB COSTING METHOD OF COST FINDING.)

CLASSIFICATION OF DEPARTMENTS. (See DEPARTMENTALIZATION.)

CLOCK CARDS. Cards used for the mechanical recording of the time of arrival and departure of workers or the starting and finishing of each task. The rulings of these cards differ with the type of time recorder used and the purpose for which the records are required. Those cards which are used for recording the times of arrival and departure of workers are known as " gate cards," and those on which are recorded the starting and finishing time of each task or job are known as " job cards." (See also GATE CARDS and JOB CARDS.)

COLLECTION OF EXPENSES. A term used when referring to the work of collecting and summarizing all the establishment expenses of a business, so that they can be allocated or apportioned to the Factory and Sales Departments, etc., for the purpose of computing the necessary rates and recovering them in costs, or to check the rates previously fixed upon estimates.

The collection of expenses and their transfer from the financial accounts to the cost accounts are the first phase in the general treatment of establishment expenses, and the actual method used will materially depend upon the system in use and the general conditions prevailing in each business. For instance, when a system of cost control accounts is in use the collection of expenses will usually be done at the end of each month or quarter, and the necessary Journal entries prepared at the same time to transfer the items to the Expense Control Account in the Cost Ledgers.

The collection of expenses may be conveniently considered under two headings: First, there will be those items of expenditure which fluctuate according to volume of production, such as weekly salaries, postages, stationery, indirect labour, indirect materials, power and lighting charges when obtained from outside sources, repairs and maintenance, works clerical assistance, and sundry expenses of varying kinds, etc. ; secondly, there are the constant expenses which will comprise such items as rent, rates, taxes, depreciation, directors' fees, fire insurance premiums, etc.

The collection of the items which comprise the variable expenses is a comparatively easy matter, as the totals for the month or other period are obtained from the financial accounts, also " Standing " or " Service " orders, and entered upon an Expense Allocation Statement, of which the following specimens show the work completed up to this stage—

Form No. 32.

EXPENSE ALLOCATION STATEMENT

For Month Ending 30th June, 192........

A/c. No.	Description.	Total.	Allocation.		
			Administrative.	Selling.	Factory.
	Variable Expenses.	£	£	£	£
A. 301	Advertising . . .	100			
B. 258	Branch Office Expenses	300			
B. 259	Bank Charges . .	400			
C. 101	Commissions on Sales	500			
C. 102	Carriage (Purchases)	600			
C. 103	Carriage (Sales) . .	700			
G. 59	Gas	800			
I. 45	Insurance : Nat. H. and Unemplymt.	900			
L. 92	Legal Expenses .	1,000			
L. 93	Lighting (Electricity)	2,000			
P. 79	Printing and Stationery	200			
P. 80	Power (Electricity) .	3,000			
S. 30	Salaries	4,500			
		etc.			
		£15,000			
	Constant Expenses.	£	£	£	£
	Depreciation—				
	Plant and Machy.	6,000			
	Buildings . . .	5,000			
	Heating Plant .	4,000			
	Insurance : Fire, etc.	3,000			
	Rates and Taxes .	2,000			
	Salaries	3,000			
		etc.			
		£23,000			

Form No. 33.

EXPENSE ALLOCATION STATEMENT

SUMMARY OF SERVICE ORDERS CHARGEABLE TO EXPENSE ACCOUNTS

For Month Ending 30th June, 192.......

A/c. No.	Description.	Total.	Allocation.		
			Administrative.	Selling.	Factory.
		£	£	£	£
	Repairs and Maintenance—				
S.O. 110	Plant	1,000			
S.O. 120	Machinery . . .	1,100			
S.O. 130	Buildings . . .	1,200			
S.O. 140	Office Fixtures and Fittings . . .	1,300			
S.O. 150	Works Fixtures and Fittings . . .	1,400			
S.O. 160	Heating Plant . .	1,500			
S.O. 170	Patterns	1,600			
		£9,100			
		£	£	£	£
	Indirect Labour—				
S.O. 210	Supervision . . .	100			
S.O. 220	Shop Clerks . .	200			
S.O. 230	Cleaning & Sweeping	300			
S.O. 240	Material Handling .	400			
S.O. 250	General Labouring .	500			
S.O. 260	Viewing, etc. . .	600			
	etc.				
		£2,100			
		£	£	£	£
S.O. 310	Storekeeping . . .	700			
S.O. 420	General Purposes .	800			
	etc.				
		£1,500			

(*Note.* When a system of control accounts is in use the entries journalizing the above figures, so that the amount of expenses can be reconciled with the financial accounts, will be found under "Cost Control Accounts" (Expense Section).)

Form No. 34.

SUMMARY OF EXPENSE ALLOCATION STATEMENTS

For Month Ending 30th June, 192........

A/c. No.	Description.	Total.	Allocation.		
			Administrative.	Selling.	Factory.
		£	£	£	£
	Variable Expenses .	15,000			
	Constant Expenses .	23,000			
	Service Orders—				
	Repairs and Machinery . .	9,100			
	Indirect Labour .	2,100			
	Storekeeping, etc. .	1,500			
		£50,700			

With regard to constant expenses, all these items may not appear in the books of account as a liability from month to month, but only at varying periods; for instance, directors' fees and depreciation, etc., will only be paid or journalized, perhaps at the end of each year, and it is therefore necessary that such items be separately listed in order that a monthly (or quarterly) quota may be fixed for inclusion in the Expense Allocation Statement.

The statement of constant expenses will, therefore, consist of expenses that are represented by actual cash payments and amounts for those items which may not appear in the accounts as a liability each month.

As these amounts must be anticipated, it is usual that Suspense Accounts be opened for each item or group of items, in order that the amount included each month (or other period) in the Expense Allocation Statement can be compared and adjusted when necessary with the actual amounts that will ultimately appear in the financial accounts. In such cases the Suspense Account at the end of each year appears thus –

Form No. 35.

SUSPENSE ACCOUNT—DEPRECIATION

Dr. *Cr.*

192_		J.E.	£	*s.*	*d.*	192_		J.E.	£	*s.*	*d.*
Dec.	To Depreciation w/o for year	130	59,500	–	–	Jan.	By 1/12th Depreciation to be w/o for year ending 192–	1	5,000	–	–
	,, Expense Control A/c	140	500	–	–	Feb.	,, ,,	20	5,000		–
						Mar.	,, ,,	30	5,000	–	–
						Apr.	,, ,,	40	5,000	–	–
						May	,, ,,	50	5,000	–	–
						June	,, ,,	60	5,000	–	–
						July	,, ,,	70	5,000	–	–
						Aug.	,, ,,	80	5,000	–	–
						Sept.	,, ,,	90	5,000	–	–
						Oct.	,, ,,	100	5,000	–	–
						Nov.	,, ,,	110	5,000	–	–
						Dec.	,, ,,	120	5,000	–	
		£	60,000		–			£	60,000	–	–

(*Note.* If Cost Control Accounts are used the entries each month would be—

Dr. Expense Control Account

Cr. Suspense Account (Depreciation)

and that the final adjusting entry (i.e. December) would be the reverse to above.)

The employment of Suspense Accounts for each group of items similar to the above enables a very close check to be kept upon all those items that will only appear in the accounts when the usual Balance Sheet, etc., adjustments are made at the end of a financial period. With large concerns, however, there will usually be many such items, and to facilitate the clerical work involved, the use of a form of analysed Ledger ruling similar to the following will be an advantage—

Form No. 36.

SUSPENSE ACCOUNT—EXPENSES

Total Annual Charge.			Item.	January.	February.	March.	April, etc.
£	*s.*	*d.*		£	£	£	£
			Depreciation .	5,000	5,000	5,000	5,000
			Directors' Fees.	1,000	1,000	1,000	1,000
			Rates and Taxes etc. .	700	700	700	700

With the above ruling only one Journal entry will be necessary each month, as the whole of the items are grouped into one account.

COMMISSIONS ON OUTPUT. The amount paid by way of commissions on output to the works manager and other factory officials is a charge to the factory expenses. In those cases where special rates of commission or bonus are paid upon certain articles, the commission is then more correctly a direct charge to the contract or works order, but if the article is being continuously manufactured, it is usual to charge the commission to a separate account and then apportion the amount over the whole of the output for the period.

The commissions on output must be kept quite separate from any commission or bonus on profits. Commission on output is a charge to production, whereas a bonus on profits paid to any factory employee is an allocation of profits.

COMMISSIONS ON SALES. The amount of commissions paid to the sales manager, travellers or salesmen, etc., may be dealt with by either of the following methods—

1. As a charge to selling expenses.
2. As a direct charge to the product or order.

1. The charging of commissions to selling expenses, so that they may be recovered as a general charge over the whole sales, is the method that is generally used when the sales comprise a variety of articles, and where the commissions paid cannot be conveniently analysed or dealt with by other methods. If the commission is paid as a general rate over the total value of orders secured and completed, and is irrespective of the type or value of the article, this method will give very good results.

2. In those cases where the orders or contracts secured are large, and where the rates of commission vary with the products or sales price, the method of charging such commissions to each product or order should be used wherever possible.

COMPARATIVE COST CARD. A record arranged for comparative purposes of the detailed factory cost of each article, component or part. In those businesses where the saleable products are finally assembled from a number of standard components withdrawn from the finished part stores, a record of the cost of each component or part will be necessary. This record serves the purpose of pricing such parts when issued from the stores, and also enables comparisons to

Form No. 37.

COMPARATIVE COST CARD

Article or Component. . . . . Part No. . . . .

. . . . Drg. No. . . . .

Works Ord. No.	Date.		Quantity Ordered.	Quantity Made.	Factory Cost.	Cost Each.					Remarks.
	Started.	Finished.				Materials.	Labour.	Machine Expense.	General Shop Expense.	Total.	

Form No. 38

COMPARATIVE COST CARD

Name of Article or Component

Part No.

Drg. No.

Works Order Number						
Date Started						
Date Finished						
Quantity Made						
Operations.	Labour Cost. Per	Factory Expense. Per	Labour Cost. Per	Factory Expense. Per	Labour Cost. Per	Factory Expense. Per
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
Total Factory Expense						
Total Labour						
Total Materials						
Factory Cost						

be made of the factory or prime cost of identical parts manufactured on the different production orders.

In some instances it may be necessary to show an analysis of the labour cost by operations or processes, so that any variations from the standard cost of each operation can be brought to the notice of the department concerned. The cause of the abnormal cost is noted in the "remarks" column for future guidance.

In an engineering works, for instance, the record may show the analysis of labour under the headings of turning, milling, drilling, gear cutting, fitting, etc., and by comparing the labour cost of each operation of the particular component, any deviation from a standard performance is easily shown.

When components or parts are drawn from stock for final assembly, the figures necessary for pricing the stores requisitions will be obtained from this record by the Costing Department.

The actual method of writing up the comparative cost record cards will naturally depend upon the type of article or component which is to be recorded, and the number of operations performed thereon. The illustration given on page 75 is only arranged to record the total of each element of cost on the respective orders. When details are required respecting each operation, the ruling can sometimes be better arranged by placing on the left-hand side of the card, in column form, the names of the various operations, and dividing the remainder of the card into columns for entering the cost of each order. For instance, assuming that seven or eight columns are ruled in the manner suggested, the headings of each column should contain space for the works order number, date commenced and finished, quantity made, as illustrated on page 76.

The comparative cost record card serves two very useful purposes. Firstly, it provides the basis of comparing the detailed cost of each quantity of identical parts made at different periods, and, secondly, it gives the figures for pricing components used on assembly orders.

COMPRESSED AIR PLANT—DEPRECIATION OF. (See Depreciation, also Plant—Depreciation of.)

COMPRESSED AIR PLANT—REPAIRS AND MAINTENANCE. The maintenance and repair of the compressed air plant are ascertained separately by means of "Service Orders," and the item charged to the "Power Expense Account—Compressed Air."

The segregation of this item is necessary in order to arrive at the total cost of the "Compressed Air" Service, which is finally charged to Machine Tools or Tool Expense Account. (See also POWER EXPENSE.)

COMPUTATION AND RECOVERY OF EXPENSES. The work of selecting the basis for recovering expenses in costs and the calculation of an expense rate for use in connection therewith.

Upon completion of the work entailed in the allocation of expenses there must, firstly, be decided the basis upon which these expenses are to be recovered in costs before the actual expense rate can be calculated.

There are a number of methods of recovering expenses in costs. No one method can be regarded as suitable under all conditions or even applicable to any one particular class of industry, as the nature of the product or goods and the conditions under which they are made will not be the only deciding factors. The size of the factory and the volume of production must to an equal extent also enter into any consideration of this subject.

The various methods principally used for recovering expenses are as follows—

(1). Percentage on direct labour.
(2). Percentage on prime cost.
(3). Departmental rate.
(4). Direct labour hour rate.
(5). Machine rate.

The methods 1 to 5 above principally relate to the recovery of factory expenses, but when the total establishment expenses of a business are not separated into factory and selling, etc., one general expense rate will then be used.

(A detailed consideration of each of the above methods will be found under their respective headings).

When selling expenses are dealt with separately, they are recovered in costs by one of the following methods—

(*a*) As a rate per article dispatched and invoiced to customers.

(*b*) As a percentage on the works cost of goods dispatched to customers.

(*c*) As a percentage on the sales value of goods dispatched to customers.

A full explanation of each of these methods will be found under "Selling Expenses."

CONSTANT EXPENSES. Items of establishment expenses which do not vary directly with the volume of output or trade, such as rent, rates, taxes, fire insurance, depreciation of buildings, directors' fees, etc. (See also ESTABLISHMENT EXPENSES.)

CONTINUOUS INVENTORY. (See Stock Record Card.)

CONTROL ACCOUNTS. (See Cost Control Accounts.)

CONVEYOR SYSTEM—DEPRECIATION OF. (See Depreciation, Plant—Depreciation of, and Service Orders.)

CONTRACT SYSTEM—METHOD OF REMUNERATING LABOUR. This is in use principally in shipyards and really amounts to a method of sub-contracting. A foreman, or some man who has the confidence of a number of his fellows, agrees to do certain work for a fixed remuneration, the firm finding materials and facilities, and the man finding the labour, with whom he makes his own terms for remuneration.

It is obvious that there is grave danger of sweating by this method, and it is not looked upon as a desirable method.

Another defect is that the employer really has no control over the labour, although the men are working on his premises.

Machine tools also suffer considerably under any system of contracting.

CONVEYOR SYSTEM—REPAIRS AND MAINTENANCE OF. The expenditure in connection with the repair and maintenance of the conveyor system is a charge to the Conveyor Expense Account, and is not directly apportioned over the departments using this service. The object here is to ascertain the total cost of running the conveyor system, as each department is charged with its proportion of the total cost, instead of each item being apportioned separately.

CO-OPERATIVE PRODUCTION—METHOD OF REMUNERATING LABOUR. (See Priestman Method of Remunerating Labour.)

CO-PARTNERSHIP—PROFIT-SHARING. Neither of these is a method of remunerating labour, strictly defined, but it is convenient to deal with them under this heading. The payment of wages is directly connected with production and, broadly speaking, may be said to be the reward of production. Schemes of co-partnership or profit-sharing are in recognition of a totally different principle, which is, that the success of any undertaking does not rest solely either on the management or the operatives, but on the harmonious relationship between the two. With a very few outstanding examples most of these schemes have proved abortive in the long run, and the reasons are not far to seek. The operative is not paid on the basis of individual output; no distinction is made between the efficient and the inefficient; profit is affected by factors outside the worker's control, whose action and reaction rather tend to discourage him; the reward is too distant for the average worker ; the fact that while workers are ready to share profits, they are not so ready to share losses.

Briefly, the essence of these schemes is that a share of the profits of the undertaking is paid to the workers in addition to their ordinary wages under a formal agreement, not as a right, but as a voluntary gift, tenable at the pleasure of the employer. The method of arriving at the fund to be distributed varies greatly, a common method being to allow a fixed percentage of the profit made above the average for a term of years past. This is a subject in itself, and reference should be made to some standard work for complete details.

COST. Costing terminology has been so loosely applied in the past that considerable difficulty often exists, both in practice and at meetings, when matters relative to costing are discussed. The word " cost " has a different meaning according to the manner in which it is used. From a technical point of view, for instance, it may be used when referring to the cost of manufacturing only or the cost of selling and distribution of goods, or to indicate the total cost of manufacturing, selling, and distribution.

Owing, therefore, to the very wide interpretation that can be placed upon this word, it should never be employed unless qualified in some particular way. By using the term " total cost " or " factory cost " there is clearly indicated the nature of the item under consideration.

The non-technical conception of the word " cost " varies with the circumstances, but in general " cost " to the average man or woman is what he or she actually pays out of pocket to obtain the desired article. But a woman going up to London to buy a hat at sale price does not, as a rule, add the railway fare and other sundries to the price she paid to the shopkeeper when displaying her bargain to a friend, yet it is quite clear that these must be included if the true cost to her of the article is to be considered. Too often " cost " has been held to be the same thing as the sum of the immediate disbursements which were made to obtain or make the desired article, all other outgoings being considered as charges against profits.

From the technical point of view every disbursement made or expenditure incurred to provide the material, labour, or facilities for manufacturing up to the point of the completion of the article must be comprised in the true cost of production.

Two conclusions are, therefore, arrived at in regard to cost-

(*a*) That a cost is final and terminates at a specific point or stage or time.

(*b*) That a cost consists of actual outgoings or ascertained charges. Cost is not a sum of hypothetical charges, which may or may not arise, and which may or may not vary from the forecast.

It will now appear obvious that the word " cost " should never be used without some qualifying word or phrase to describe its application ; for instance, the purchase of sheet brass for a metal working factory may be said to " cost " money. But this is a purchase for stock, purely a financial transaction, and although it has " cost " money, this money expended does not represent a " cost " to the business or an element in the " cost of production." It may be resold either in the course of the merchanting activities of the business or to realize the cash locked up for the purpose of capital expenditure. It is more accurate to talk of the " purchase price " of the sheet brass, and when handed over to the factory, to charge it to an order or process, when the value at which the transfer is made may be correctly looked upon as an element of the cost of that order or process.

The technical conception of cost practically rules out the possibility of a cost being comprised of one element alone as in practically all cases a " cost " is the sum of three groups of components, viz., the purchase or transfer price of material, the cost of the hire of labour, and the value of other disbursements made or expenditure incurred in achieving the desired product or result.

The components of cost are classified into three groups and are known as—

(1). Direct labour,
(2). Direct materials,
(3). Establishment expenses.

These elements are again grouped into factory costs and selling and distribution costs.

COST ACCOUNTANT—SALARY OF. The amount of salary paid to the cost accountant is an item of establishment expense and may be allocated direct to administrative expense or apportioned over the factory, selling, and administrative sections of the business, according to the extent it is estimated each benefits from the functions of this official. In some instances the Cost Department may be regarded as a part of the factory organization and the expense allocated accordingly, but such treatment of this item is incorrect.

COST CONTROL ACCOUNTS. Accounts which form the medium of controlling all the expenditure chargeable to costs and which will also automatically provide the means of reconciling all expenditure with the financial accounts.

From the above it will be apparent that if a system of cost accountancy is to be of any use to a manufacturer, the system must function correctly in each of its three divisions.

The following is an explanation of the principles of control, and the manner in which the expenditure so " controlled " is reconciled with the ordinary books of account.

The control and reconciliation of cost accounts should be frequent, and the system arranged in such a manner that this frequent check is provided automatically and without the necessity of extracting from the ordinary accounts special and separate statements.

For the purpose of " control " the expenditure of a business must be grouped and summarized according to incidence, i.e. labour, materials, and expenses, and each item again subdivided, should the size of the business warrant it.

The principle upon which the control accounts are operated is as follows—

The financial control of materials is facilitated if the various items are subdivided into suitable headings, such as—

(*a*) Control of standard raw materials (i.e. those which comprise the output of the works or factory).

(*b*) Control of completely manufactured goods bought outside and resold in the same condition as purchased.

(*c*) Control of goods manufactured in the works or factory and which are ready for resale.

With regard to (*a*) and (*b*) the accounting transactions of these items in the financial books will have been dealt with, firstly, in the Purchase Day Book, and secondly, by posting the totals in the General Ledger as a debit to purchases and credit to sundry creditors.

In the Cost Department the " control " is effected as follows—

(*a*) Standard raw materials.

Dr. Control Account Raw Materials

(*b*) Factored goods.

Dr. Control Account Factored Goods

In order to complete the principle of double entry in the Cost Ledger and render it self-balancing, the control entries to the above may be as follows—

Cr. General Ledger Adjustment Account

The above debits (*a*) and (*b*) to the control accounts represent the value of materials delivered to or placed in the raw material stores and the factored goods stores. The credits to these accounts are effected in the following manner—

The total value of all materials or goods issued from stores for manufacturing purposes, which is obtained from summaries prepared in the process of cost finding of the values of all stores requisitions, less the value of stores credit notes, is journalized—

Dr. Work in Progress Account·
Cr. Control Account (Raw Materials)

As and when components or each batch of work is completed and passed into the finished stores (*c*), the value of the work will be journalized as follows—

Dr. Control Account (Finished Stock)
Cr. Work in Progress Account

The credit to Work in Progress Account for wages and other charges on completed work will also be made at the same time, but these entries will be explained when dealing with the control accounts for those items.

The above Journal entries will be made at frequent periods, which may be daily, weekly, or monthly, according to the requirements of the business, and at the end of accounting or financial periods the necessary adjustments relating to losses and wastage in stores, etc., must be made. This is usually effected by charging all such items to a Stores Losses and Wastage Account, the corresponding credit being made to the Raw Materials Control Account.

It is sometimes the practice to debit any losses in the stores to the Work in Progress Account, and to close the account periodically by transferring from the Work in Progress Account (at the same time as completed work is transferred) to the ordinary Manufacturing or Trading Account in the financial books.

With very large concerns the " Stores Losses and Shrinkage Account " can conveniently be subdivided according to the increase of—

(*a*) Shrinkage.
(*b*) Losses due to evaporation, etc.
(*c*) Breakages.
(*d*) Loss on turnover (i.e. weighing, etc.).
(*e*) Faulty materials rejected by works.
(*f*) Obsolete stock.

It will now be observed that the Raw Material Control Account, besides being the means of providing effective control over all materials purchased and consumed, provides a perpetual inventory of materials in sterling, and, furthermore, is the medium which will automatically reconcile the values of all purchases as shown in the financial books with the Cost Accounts, without the necessity of preparing separate and special reconciliation statements previously referred to.

Control Accounts will establish full control over materials purchased, and enable their use to be traced to the various jobs, operations and processes. It may be observed here that with the cost finding section of a costing system stock record cards will be in use which will only record the receipts and issues from stock in terms of units instead of values.

A Raw Material Control Account, if operated on the above principle, will discharge three essential functions in the materials section of a costing system, namely—

1. A perpetual inventory of stores in terms of money.
2. Effective control in total and in detail.
3. The perpetual reconciliation of material costs with the financial accounts.

With regard to the perpetual inventory of stores it will be readily conceived that the preparation of accurate monthly or other periodical Manufacturing or Profit and Loss Accounts and other statistics will not only become possible, but will enable such accounts to be compiled in less time and with more accuracy than is otherwise the case when the item has to be estimated or calculated upon performances and conditions that vary from day to day. With some costing systems an attempt is generally made to obtain this perpetual inventory by combining both quantities and values on the one stock record, under the assumption that such a method will entail less clerical labour than when two records are maintained. This type of record is usually in the form of a loose-leaf book or card system, and is given the title of Stock or Stores Ledger.

In actual practice, however, this method is found to be very inaccurate, and, instead of being economical, is actually more expensive, because it entails a considerable number of calculations, whereas with the method already described values are dealt with in totals only, either daily, weekly, or monthly, and details in terms of units recorded by means of the orthodox stock record cards. A Stores Ledger which combines a record of both values and quantities has a very limited application, and it should never be used by firms whose consumption in raw materials and parts runs into a large number of different items. With those industries, however, that only use a small number of items the method has its advantages.

The cost control of labour proceeds on similar lines to that described for materials, but in this instance the total wages paid is subdivided into "direct" and "indirect." This analysis is very easily accomplished, as in the majority of cases all "direct" labour is automatically separated from the "indirect" by trades or departments. In cases where the pay roll is not ruled to give the necessary form of analysis, the segregation may be effected by means of a system of service orders. Alternatively, the information would be obtained from summaries prepared in the Cost Department, from the process of cost finding.

The journalizing of wages will proceed on similar lines to materials, but in this instance Wages Control Account is debited with the total wages paid as shown by the pay roll. This account is then credited with the amounts as shown by the pay roll analysis, or from summaries which show the allocation of wages either direct and indirect or departmentally, mentioned above, as follows—

In the financial books—

Dr. Wages Account
Cr. Cash

In the Cost Department—

Dr. Wages Control Account
Cr. General Ledger Adjustment Account

The amounts as shown on the pay roll summaries are then journalized in the Cost Department—

Dr. Work in Progress Account (with Direct Wages)
Dr. Factory Expense Account (with Indirect Wages)
Cr. Wages Control Account (with the Total Direct and Indirect)

The effect of the above entries is, firstly, to transfer from the Wages Account in the financial books the total amount spent for the week (or other period); and, secondly, to charge (*a*) work in progress with the amount of direct wages spent on production, and (*b*) Factory Expense Account with the amount of indirect wages which has to be ultimately recovered as an indirect charge on the factory's output.

It will be seen that these two items must now be dealt with separately so far as "control" is concerned, as the credits to Factory Expense Account (and other expense accounts) will represent the amount of works expenses absorbed by the respective jobs or orders or work in progress and will, therefore, include other indirect expense items.

Continuing with direct wages, a similar procedure is followed as described for materials, the Work in Progress Account being credited with the value of direct labour expended on each job or process as and when completed, as follows—

Dr. Finished Stock Control Account.
Cr. Work in Progress Account.

The above entry will only be made as and when each job or process is completed and will include, in addition to the amount of direct wages now under consideration, the cost of direct materials (already dealt with) and also the correct proportion of works expenses.

The routine for control of wages assists control of cash expenditure just the same as materials control. If every penny spent on wages is to be accounted for, it follows that it becomes a matter of extreme importance, and that there must be a thorough system of allocating each man's time; firstly, according to the nature of the work done, that is to say, work on production, repairs or indirect labour, and, secondly, such time must be further analysed on (1) work for specific items of production, (2) repairs in specific departments, and (3) different classes of indirect labour.

With regard to "indirect labour" the analysis provided by the pay roll will not meet all requirements, and in such cases where a more elaborate analysis is required, as with large works, the segregation of indirect labour is effected by means of "standing orders" or "service orders."

Expense Control. The expenses of a business are divisible into two main groups, that is—

1. Expenses that have been specially incurred for specific orders and can, therefore, be charged direct to the specific job, operation, or process; and

2. Those expenses which have been incurred in running the business, which can only be apportioned according to some logical method.

Number 1 will not form part of the expenses now under consideration, as these items will be charged direct to their respective jobs or processes, and consequently will require slightly different treatment so far as "control" is concerned.

With regard to 2 the items which comprise this group are known as establishment expenses, and these will again be further analysed into—

1. Factory expenses.
2. Selling expenses.
3. Administrative expenses.

This grouping assists in the control of all indirect expenses in a similar manner, as did the subdivision of both materials and labour in the principles of control already explained.

The control of expenses will differ slightly in detail from that of materials or labour, as provision has firstly to be made for their " collection " and " allocation " to sub-accounts.

This collection and transfer are effected by preparing in the Cost Department a Journal entry of all items, as follows—

Dr. Expense Control Account.
Cr. General Ledger Adjustment Account.

The Expense Control Account is the means of controlling in total the expenses of a business, and all the debits to this account must agree with the total expenses as shown in the financial books. It must be noted, however, that the principles of control will be differently applied to each factory, and the above specimen entry is only given as a general example. It is sometimes possible, for instance, to charge the respective sub-expense accounts, which are described below, with many items direct from the financial books, and in such cases the total credits to the Establishment Expense Account will form the basis of reconcilement in total between the financial books and Cost Department.

The credits to the Expense Control Account will be effected in a slightly different manner from that described for materials and labour, as the amounts must now be transferred to their respective sub-accounts, i.e.—

Factory Expense Account.
Selling Expense Account.
Administrative Expense Account.

Before the function of expense " control " can be completed, it is necessary that the total expenses be " allocated " to their respective sub-headings, and when this has been effected the results as shown by the expense allocation statement are journalized as follows—

Dr. Factory Expense Account
Selling Expense Account
Administrative Expense Account
Cr. Expense Control Account

(Note that Factory Expense Account has already been debited with indirect wages.)

With regard to administrative expenses, when it is the practice to proportion these over both the Factory and Selling Departments, a further entry is made—

Dr. Factory Expense Account £
Selling Expense Account £
Cr. Administrative Expense Account £

The effect of this entry is to close the Administrative Expense Account, and during the period this account was in operation there was effected reconcilement with the financial accounts in the first place, and in addition such expenses are "controlled" up to the point where the Factory and Selling Departments are charged with their due proportion.

The credits to the above accounts will arise in a similar manner as was described for materials and direct labour, and the amount of works expense recovered in costs is journalized as follows—

Dr. Work in Progress Account
Cr. Factory Expense Account.

As and when each component, batch of work, or works order is completed and passed into the finished stores (*c*), the value of expenses is journalized in a similar manner as was done with materials and labour, i.e.—

Dr. Finished Stock Account £
Cr. Work in Progress Account £

and thus effects complete control with expenses as was done with labour and materials.

Having dealt with each of the control accounts individually, we are now in the position to journalize the total value of work, i.e. materials, labour, and expenses to the Finished Stores Control Account. We now, therefore, arrive at the point where the two previous entries can be combined with the entry described above for expenses, and so complete the working of all the control accounts up to the point where the goods enter the finished stores.

This transfer is effected by combining the three Journal entries given above for materials, labour, and works expenses in the following manner—

Dr. Finished Stock Control Account (*c.*) £
Cr. Work in Progress Account—
Materials Section £
Labour Section £
Expenses Section £

The three entries referred to were given separately in order that the control of each element of cost could be more easily followed, as in practice the Finished Stores Account will only deal with the total cost of the products as illustrated in the above entry. It will be noted that at this point we are only concerned with the works or factory cost of goods made. The expenses of selling and distribution do not form part of the works cost or cost of production and their treatment—so far as cost control and reconciliation are concerned—will take a slightly different form from that already described for materials, labour, and works expenses.

In order to assist in the description of a method of applying the principles of cost control, as a means of reconciling the workings and the result of a costing system, it has been necessary to presuppose the existence of some form of financial or works organization. In the many examples already given it has been assumed that the function of production or manufacture is, from the point of view of "cost," treated separately from selling and distribution. We have, therefore, provided the basis for reconciling all the items which enter into the works cost, or cost of production, with the total amount of expenditure as shown in the financial accounts.

When dealing with the control of materials, all purchases were subdivided into the three groups (*a*), (*b*), and (*c*), and a Control Account provided for each group. The control of raw materials (*a*) by means of the Raw Materials Control Account has already been effected, and there now remains the Factored Goods Control Account (*b*) and Manufactured Goods Control Account (*c*) to be dealt with.

With regard to the Manufactured Goods or Finished Stores Control Account, it will be noted that the entry given above transfers the cost value of complete work from the factory, i.e. Work in Progress Account, to the Finished Stores, and commences the operation of the section (*c*) referred to in regard to control and reconciliation.. The issue of goods for packing and/or dispatch to customers will form the basis for crediting this account. The system in use for the movement of finished stocks will naturally differ with each factory, but for the purpose of illustration it is assumed that the Sale Department will issue an order or requisition to the superintendent of the finished stores, authorizing him to "move the following goods to Packing and Dispatch Department, etc." A stores requisition of a distinctive colour will be required for this purpose in order to differentiate from the stores requisition used in the factory, and also to facilitate the work of the Cost Department.

From the summaries of the above issues, which can conveniently be prepared in the process of cost finding, the Finished Stores Control Account is operated in a similar manner as was done with the raw material stores, but in this instance a "Cost of Sales Account" is charged in place of the Work in Progress Account, as follows—

Dr. Cost of Sales Account £
(Issues from Finished Stores)
Cr. Finished Stock Account £

The Finished Stock Control Account is the means of controlling in total the values of finished goods, and the balance shown in this account at the end of each costing or financial period represents the factory cost of goods on hand.

To reconcile in detail the balance of the Finished Stock Account with the actual items in stock is very easily effected, if a proper system of stores records is in use, as the stock record cards (or ledgers) should provide the means of reconciliation in detail.

Mention of a Factored Goods Control Account (*b*) has already been made, and the entries in connection with the movement of factored goods on this account will be made in a similar manner as with those described above.

The Journal entries given above, which cover the final movement of stocks, form the basis of charging a Cost of Sales Account with the value of goods dispatched to customers. In the case of manufactured goods, it will be remembered that the Stock Control Account was debited *at factory cost*, but with factored goods the Cost of Sales Account must be debited at "*purchase*" *price*. Control is now completed by debiting "cost of sales" with the correct proportion of selling and distribution expenses for the period under review.

Having ascertained the amount of selling expenses chargeable to the Cost of Sales Account, the amount is journalized—

Dr. Cost of Sales Account
(Selling Expenses) £
Cr. Selling Expense Control Account £

ADJUSTMENTS. The many differences and adjustments that will invariably arise in practice have to be dealt with as, for instance, the under or over absorption of works expenses, etc., but as the precise nature of each adjustment will vary with each factory, due to the varying types of organization, it will only be possible to deal with those items that are more or less of a general character.

The question of expense adjustment will usually arise at the close of each costing period, and the method of dealing with these items will depend upon the method in use for allocating and recovering expenses in the cost accounts.

If the total factory expense for the year is assumed to be £12,000, there will be a monthly quota of, say, £1,000, that is, factory expenses should be absorbed at the rate of £1,000 per month, which is the basis of adjustment. It will, therefore, be seen that the adjustment of factory expense will not present any difficulty, as the difference between the monthly (or other period) quota is dealt with by transferring this difference to an Unabsorbed Factory Expense Account as follows—

Dr. Unabsorbed Factory Expense Account £
Cr. To Factory Expense Account £
(Being amount of factory expense unabsorbed for
month ending...)

The object of treating the question of adjustments in this manner will be obvious if it is borne in mind that the aim is to reconcile costs with the actual expenditure incurred, and as shown in bulk in the financial books. All differences arising, therefore, between the amounts charged to or accounted for by the control accounts (which it must be remembered are simply summaries of the detailed costs as obtained in the process of cost finding) and the total expenditure, as shown by the financial accounts, must be dealt with in such a manner as will clearly indicate the cause or reason for the difference.

In the case of selling expenses a similar procedure will be followed, and a separate account opened for this purpose.

The method of treatment of any balance shown in the two Unabsorbed Expense Accounts will depend upon the policy of the management, but it is generally considered more correct if the amount is ultimately charged to Profit and Loss Account, and not charged as an additional expense to the factory cost.

It will be observed from the above remark that the allocation of factory expense, on the basis of the normal output capacity of the factory, is advocated in preference to the reduced output capacity that is usually arrived at by estimating the amount of business that might be secured during the period under review. The latter method is based upon the fluctuation of demand or state of trade, and it will readily be seen that such a method destroys any possibility of comparison of costing data or efficiencies. If sufficient orders are not secured to keep the factory running at full (or ordinary) time, the fact must be borne in mind, and the increased cost of production due to this cause should be clearly shown by the cost accounts, a factor which is only possible by the method advocated.

The adjustment of any differences arising with the Direct Labour and Direct Material Control Accounts will be less difficult than with expenses. With direct labour the details can be reconciled with greater precision than is possible with the various expense accounts ; for instance, the exact amount of labour chargeable to the respective production orders or processes is easily ascertained by the aid of a proper system of time booking, likewise direct materials should also be capable of easy reconciliation by means of an efficient system of stores accounting.

The detailed items that may arise for adjustment in practice will vary according to the type of costing system in use, but the majority of errors will generally occur through the under or over charging of individual jobs or processes, and the entries necessary in such cases will therefore be obvious.

COST DEPARTMENT—EXPENSES OF. The total expenditure incurred in maintaining the Cost Department, which will include the salary of the cost accountant and his staff, stationery, postages, telephones, etc., will form part of the establishment expenses of the business.

The expense of this department is best dealt with by allocating direct to the administrative expense, although in some instances it may be apportioned over the factory, selling, and administrative sections of the business, according to the extent it is estimated that each benefits from the costing system.

In many instances the expense of running a costing system is regarded as an expense which should be charged to the factory, but such treatment of this item is not correct, as a Cost Department that is properly organized should be of benefit to the three sections of the business, and from this point of view the expense is essentially administrative in its proper sense, and should be dealt with accordingly.

The total expense of running a Cost Department and a costing system will usually be ascertained chiefly by direct allocation, as the various items of expense can be collected in this manner, but the sundry items of expenditure, such as for general stationery, office cleaning, lighting, heating, etc., will require to be apportioned.

It will be noted from the above that a Costing Department is essentially a " service " department, and differs from the usual service departments of a factory in that it renders a service to the business as a whole and not to one particular section.

COST ESTIMATING. The predetermination of the probable components of a cost when incurred under a given set of conditions.

COST FINDING—METHODS OF. The particular method of cost finding used depends upon the nature of the industry and the class of product made. The output has to be measured and the mode of measurement depends absolutely on the form of the product and its method of manufacture. The cost of the output may have to be reckoned by the piece, pound, dozen, barrel, yard, article, etc., and by taking one of these classifications, and using arithmetical figures, the total can be obtained. In some trades the unit might be the article or batch of articles produced, a piece of machinery, a complete job or order as in an engineering works or a general repair shop, and in some cases in foundries. The unit in the case of builders or contractors would be the completed job or contract. An electric supply company would require the Board of Trade unit, or kilowatt hour.

In other trades the unit may be related to the " process," as with chemicals, tanning of leather, flour, bricks, and cement, etc.

Various methods of cost finding are used in practice, but these may be conveniently grouped under three main headings, i.e.—

(1) Job costing.
(2) Process costing.
(3) Operative undertaking costing.

(1) **Job Costing,** which is very often referred to as the order method, is used when all the various items are charged to a specific order, which may be for one or a quantity of articles or for a particular operation.

With this method the amount expended on labour and materials is charged to a particular order number together with its share of expenses, and the sum total constitutes the cost of the job, order or operation.

(2) **Process Costing** is employed in cases where there is a

variety of processes or operations before a completed product is turned out, and where it is necessary to find the cost of each variety of operation. This method is particularly necessary where by-products occur or where one article out of a batch loses its identity during the process of manufacture. By this method comparison of the costs of different operations is possible and prices at each stage can be fixed. Process costing is used in most food producing factories, chemical works, and in the manufacture of paint, etc.

(3) **Operative Undertaking Costing** is the essential method where services are rendered rather than goods produced. A single measurement demonstrates the work performed, though it may vary in kind as when a railway company reckons work performed as per ton mile or per passenger mile, etc., or an electric supply company per Board of Trade unit or kilowatt hour. Operative costs render possible the costing of transport undertakings and other public utility concerns, such as water works and gas companies.

Many other terms are often used to denote a method of costing, but all of them relate to one of the above, for instance.

Single or Output Costing is a term often used to denote the method of costing employed in such businesses as supply one rather than many products, and where it is desired to find the actual or average cost of one unit, weight, measurement or container per ton, per yard, 1,000 bricks or a sack of flour.

Such a term, however, merely refers to the job or process method of costing. Most manufacturing businesses use either the job or process method or a combination of the two when departmentalization or a division into processes is usual or desirable.

Departmental Costing is a term used when it is desired to ascertain the cost of the output of each department separately. The method used in such cases is also the job or process, or a combination of the two.

Terminal Costing refers to the ascertainment of the cost of carrying out a contract, such as the erection of buildings, bridges or irrigation schemes, etc. This method of costing, however, is the same as the job costing system.

Multiple Costing relates to the system used in such businesses as make a variety of goods which differ both in value, in kind, and in the number or variety of processes necessary for completion. These accounts, however, are based on the job costing method.

Elements of Cost. To employ any of the above methods of costing it is necessary that money expended be analysed according to its use. This analysis firstly takes the form of segregating expenditure under the heads of—

(1) Materials.
(2) Labour.
(3) Expenses.

Such are known as elements of cost and the sum of these elements comprises the total cost.

COSTING. A collective term implying the technical and financial utilization of data obtained by the co-relation of cost finding, cost control, and cost estimating.

COSTING TERMS. Costing terminology has been so loosely applied in the past that considerable difficulty often exists when it is necessary to define a particular term.

For instance, the word " cost " is very frequently used and it may refer to the cost of manufacturing only, the cost of selling and distributing the goods, or it may be used to indicate the total cost of manufacturing, selling, and distribution. Owing, therefore, to the very wide interpretation placed upon this word, it should never be employed unless qualified in some particular way. Many other terms are given an equally wide meaning, such as " oncost," " overheads," " burden," etc., but all of these relate to the one particular element of cost. Such terms do not correctly indicate the nature of the item in question, and it is recommended that the term " establishment expense " should, therefore, always be used.

COST OF PRODUCTION. (See Factory Cost.)

COST OF SALES ACCOUNT. An account which is used to ascertain the amount of profit made on sales each month or other period. A Cost of Sales Account should analyse the results either by departments or products and when used in connection with a Work in Progress Account, they may replace the orthodox Manufacturing Account. These two accounts show in a summarized form the results of both the manufacturing and sales activities of a concern, and are more useful in this direction than the general form of financial statement usually prepared from the ordinary books of account.

The example of a Cost of Sales Account on page 96 illustrates the general principles of its construction only, as the actual form and number of sections in which this account may be drawn up in practice will depend upon the class of business and the nature and number of products sold, etc.

Form No. 39.

COST OF SALES ACCOUNT

For Month Ending..............................192........

	£		£
To Cost of Goods issued from Finished Stores and Despatched to Customers		By Sales *Less* Allowances . .	
,, Carriage on Goods Sold		,, Factory Cost of Goods Returned and Placed into Finished Stores	
,, Sales Expenses . .			
,, Goods Returned by Customers and placed into Finished Stores .			
,, Cost of rectifying Complaints of Customers.			
,, Balance, being Net Profit on Sales . .			

(See also Cost Control Accounts.)

COST PREMIUM—METHOD OF REMUNERATING LABOUR. This method gives the workers not only a direct interest in the time saved, but also endeavours to induce them to be economical in the use of raw material and to reduce certain items which are materially affected by the care or otherwise on their part ; for example, lighting, repairs to machinery and tools, and indirect material.

In order to avoid frequent alteration to the standard cost figure, the cost of raw material is calculated at a fixed price. As an example, let us take a hypothetical case—

	Per Ton. *s.*	*d.*
Raw Material	20	–
Average Day Wage	60	–
Average Expense of Selected Items	15	–
Total	95	

The standard cost would then be considered to be 95s. per ton. Assume now that the total cost be reduced to 90s. per ton, the 5s. per ton saved forms the fund from which the premium will be paid. In some cases both management and workers share equally in the bonus, but in view of the fact that the saving effected is entirely due to the operative, this does not appear to be an equitable distribution.

Operatives are usually paid the premium in proportion to their daily rates. Of course, the efficiency values of men hardly ever coincide with their time rates, and in some cases age and length of service are taken into consideration, and to get the best out of this method the distribution should be on a scientific basis.

Charge hands and foremen are sometimes given special consideration. The method can be applied both on a time rate and piece rate basis. There are a number of ways in which the distribution can be effected and also of calculating it, but the above example will suffice to indicate the principles.

COST SUMMARIES. A form on which the detailed amounts of direct labour, direct materials, direct charges, and the proportion of expenses are finally summarized in order that a final or total cost of a job, order, or series of operations can be ascertained.

The extent to which cost summaries will be used and the form of ruling depends upon the method of cost finding, the nature and size of a business, and the amount of information required by the management. An example of summaries will only be given, therefore, to illustrate in a general manner their form and the amount and type of detailed figures usually given.

With many systems of job costing the summary of the total cost of a job or works order is shown at the top of the sheet which is contained in the Job Cost Ledger, and an illustration of such a form will be found on page 352.

The two specimen forms given (40) and (41) are almost self-explanatory. The form (40) indicates the general layout of a cost sheet suitable for summarizing the cost of works orders that have not been split up into sub-orders. Form (41), however, illustrates the type of summary used when the main works or production order has been analysed and sub-orders issued for each operation or the manufacture of each component part. In such cases the cost of each sub-order will firstly be summarized on form (40), and the total cost of the complete order obtained by summarizing the costs of all sub-orders on a form similar to (41).

The foot of either of the above forms is generally ruled to accommodate an analysis of labour, materials or time according to requirements.

Form No. 40.

COST SUMMARY SHEET

DESCRIPTION OF ORDER :	PRODUCTION ORDER Nº
	DATE ISSUED
	DATE COMMENCED
	DATE FINISHED
	SPECIFICATION NUMBER

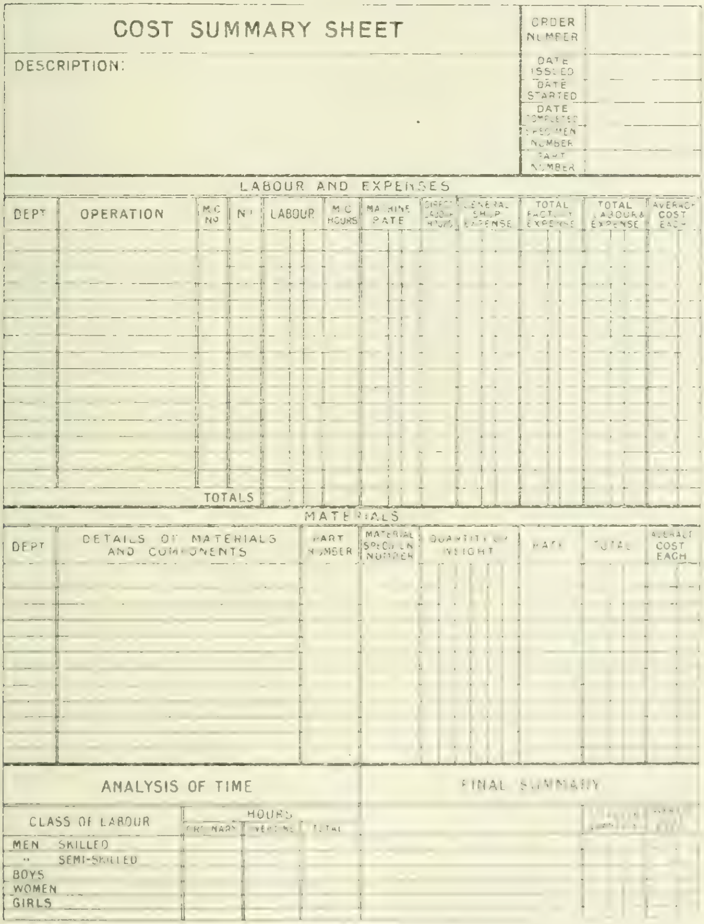
P.O. Nº	NAME OF PART	QUANTITY	TOTAL COST				COST EACH			
			MATERIALS	LABOUR	EXPENSE	TOTAL	M'TL	LABOUR	EXPENSE	TOTAL

ANALYSIS OF MATERIALS					ANALYSIS OF LABOUR					ANALYSIS OF TIME		
CLASS	QUANTITY	£	s	d	OPERATION	HOURS	£	s	d		HOURS	
											ORDINARY	OVERTIME

COST RENDERED	APPROVED	FINAL SUMMARY Nº

In those cases where the works order covers a large quantity of articles, it will sometimes be necessary to use separate cost sheets for summarizing the labour cost and material cost in addition to the final summaries referred to above. The necessity for these additional summaries will usually arise from the fact that a considerable number of items relating to both labour and materials require summarizing before the

Form No. **41.**



COST SUMMARY SHEET

DESCRIPTION:

ORDER NUMBER

DATE ISSUED

DATE STARTED

DATE COMPLETED

SPECIMEN NUMBER

PART NUMBER

LABOUR AND EXPENSES

DEPT	OPERATION	M/C No	No	LABOUR	M/C HOURS	MACHINE RATE	DIRECT LABOUR HOURS	GENERAL SHOP EXPENSE	TOTAL FACTORY EXPENSE	TOTAL LABOUR & EXPENSE	AVERAGE COST EACH
	TOTALS										

MATERIALS

DEPT	DETAILS OF MATERIALS AND COMPONENTS	PART NUMBER	MATERIAL SPECIMEN NUMBER	QUANTITY OR WEIGHT	RATE	TOTAL	AVERAGE COST EACH

ANALYSIS OF TIME

CLASS OF LABOUR	HOURS		
	ORDINARY	OVERTIME	TOTAL
MEN SKILLED			
" SEMI-SKILLED			
BOYS			
WOMEN			
GIRLS			

FINAL SUMMARY

costs of a works order or sub-order can be completed, and in such cases a labour collecting sheet and material collecting sheet may be used.

The use of such forms, however, will be governed entirely by the actual routine of the Cost Department. For instance, instead of summarizing the labour costs of each worker upon the labour collecting sheets, it will sometimes be found more convenient for the cards to be totalled by the aid of an adding and listing machine, in which case the additional summary will not be required.

Form No. 42.

COST SUMMARY SHEET

ORDER Nº ______ CLOTH ______
Nº OF LUMPS ______ WIDTH ______
LENGTH ______ PIECES OF 30 YDS ______
GREY WEIGHT PER LUMP ______ Nº OF PATTERNS ______
WHITE " " " ______ WAYS " " ______
FINISHED " " " ______ PIECES PER WAY ______
Nº OF BOXES ______ PIECES PER HOUR ______
RATE OF PRODUCTION *(MACHINE ROOM)* ______

STYLE ______ REF Nº ______
DATE ______ STYLE Nº ______

(PATTERN TO SHOW STYLE - GUM HERE)

PROCESS			DRUGS AND COLOURS	BLANKETS & GENERAL STORE	RATE OF RUNNING	WAGES, (P.W)		STEAM AND ELECTRICITY		EXPENSES NORMAL		TOTAL COST PER PIECE
			PER PIECE	PER PIECE	PIECES OF 30 YARDS	PROCESS HOUR COST	COST PER PIECE	PROCESS HOUR COST	COST PER PIECE	PROCESS HOUR COST	COST PER PIECE	
PRELIMINARY												
TOTAL												
SPECIAL	HOURS WORKING	Nº OF TIMES THROUGH										
TOTAL												
FINISHING												
TOTAL												
WAREHOUSE CHARGES												
FREIGHT												
ETC.												
TOTAL												

	PER PIECE OF 30 YARDS	PER YARD
MANUFACTURING COST		
NORMAL EXPENSES		
MARGIN		
SELLING PRICE		

SELLING EXPENSES			
TOTAL			

COSTS BASED ON PERIOD
IDLE CAPACITY DURING PERIOD
% OF TIME WORKED " "

Likewise the stores requisition, relating to the order, may also be dealt with in this manner, and in such cases the cost summary ruled similar to forms (40) and (41) will usually be found sufficient for most purposes.

For illustrations and further description as to the use and compilation of labour cost collecting sheets and material cost collecting sheets, see under their respective headings and p. 244.

The above forms of summaries are specially suitable for the job costing method, and where a system of process costing is in use a slightly different form will be needed. The illustration given (Form 42) is a process cost summary, arranged to show the cost of the article by processes.

CRANES AND HOISTS—DEPRECIATION OF. (See DEPRECIATION, also PLANT—DEPRECIATION OF.)

CRANES AND HOISTS—REPAIRS AND MAINTENANCE OF. The expenditure incurred in the maintenance and upkeep of all cranes and hoists, etc., is best collected by means of a system of service orders. In the case of large concerns, particularly in the heavy engineering industries, where each department is provided with its own lifting devices, the expense will be analysed to each department and included among the department's expenses.

With the smaller concerns there may be only, say, one electric crane provided for handling heavy raw materials and for general stores work, in addition to the handling of work in the heavy machine or erecting shops. In such cases the maintenance charges are debited to an account which will also receive debits for the power consumed, wages of crane driver and assistants, depreciation, etc. The total of this account is then apportioned over the respective shops according to the extent it is estimated each benefit from this service. In the case of very large firms the expense of "material handling" will be dealt with in costs as a separate item, and it is then necessary to analyse the repair and maintenance charges of cranes, etc., according to their use. In those instances where cranes are specially used for material handling, the segregation is a simple matter, but when a crane is used for a variety of purposes the repair charges are best dealt with upon the same principle as described above for small concerns, i.e. logical apportionment.

There may, however, be isolated instances where each crane driver can be provided with a time sheet on which to record the various classes of work and the time occupied on each, and this record may be used as a basis for analysing the expenses, but in practice this method will only be found practicable when a crane is occupied on each job for fairly long periods.

The question of depreciation will sometimes affect the method of dealing with repairs and maintenance charges, as it may be the practice to debit such charges to Depreciation Account for the reason that when establishing depreciation rates, the estimated cost of repairs and maintenance was taken into consideration. (See also REPAIRS AND MAINTENANCE, and SERVICE ORDERS.)

CREDIT AND STOWING MATERIALS. A description often given to that phase of a storekeeper's duties which relates to the acceptance from the producing departments of surplus materials on an order and the replacing of them in their respective bins, the issue of a stores credit note, and the entering of the item on a bin card.

This phase of storekeeping may be said to follow that of issue and recording. (See also STORES ROUTINE.)

DAY RATE. (See TIME RATE METHOD OF REMUNERATING LABOUR.)

DAY WAGE. (See TIME RATE—METHOD OF REMUNERATING LABOUR.)

DAY WORK. (See TIME RATE METHOD OF REMUNERATING LABOUR.)

DEBENTURE CHARGES. (See DEBENTURES—INTEREST ON.)

DEBENTURES—INTEREST ON. The treatment in cost accounts of interest paid on debentures will depend upon the reasons for which the debentures are issued. The interest charges payable upon debentures that have been issued for short periods and for the specific purpose of providing extra working capital to finance a special contract are a direct charge to the particular job or work for which the money was obtained.

If interest charges in such cases are included among the establishment expenses and regarded as a general charge over the whole manufacturing and selling activities of the business, the ordinary output or work that has been performed, and for which the money was not required, will be carrying an expense for which it has received no benefits, whereas the special contract or work will not be charged with its correct amount of expense.

Debentures that have been issued to provide additional working capital for the whole business may be dealt with by either of the following methods—

(*a*) As a general charge to the business and included among establishment expenses.

(*b*) As a charge against gross profits.

(*a*) **Charge to Establishment Expenses.** The inclusion of debenture interest among establishment expenses may be dealt with by two methods—

(1) To regard the interest as a general charge over the whole business by firstly allocating it to administrative expense, and then to arbitrarily apportion over the factory and selling departments, alternatively.

(2) In cases where the money obtained from the debentures has been spent in the extension or erection and equipment of a new department or departments, to charge the interest to the expenses of such departments only.

The actual treatment of debenture interest in the cost accounts will not present much difficulty, as in the case of method 1 above being adopted, the expense will have been merged in with all other administrative expense items, which will be dealt with in total and apportioned over the respective departments or sections of the business upon some arbitrary basis. Each case, however, must be considered upon its own merits, as it may be that a larger portion of the extra capital will be spent upon, say, advertising, and only a small amount actually used in production. In such a case it would obviously be incorrect to charge the interest to the Factory and Selling Departments in equal proportion. On the other hand, if the greater part of the money is expended in new plant, then the factory should bear its correct share of the expense.

In the case of method 2 the interest expense will be allocated direct to the department or departments and not spread over the whole factory, but if a machine rate is being used the item can be dealt with more scientifically if the amount spent in the purchase of new machine tools and new buildings is separately ascertained, as this will then enable each machine tool or group of machines to be charged its correct amount.

(*b*) **Charge Against Gross Profits.** When interest on debentures is regarded as a charge against the gross profits of the business, the item will not appear in the cost accounts, but will be dealt with at the end of each financial period by transferring the amount direct to the Profit and Loss Appropriation Account.

(For general consideration of interest charges see INTEREST ON CAPITAL.)

DEFECTIVE WORK—COST OF. The treatment of losses arising from defective work will depend upon the nature of the products made, the amount of expense involved, and the cause of such defects.

With some industries slight defects rectifiable at very little expense arise during the course of manufacture. These may be regarded as unavoidable within limits, and in such cases the cost may conveniently be charged against the product or process concerned, and providing some means be available of checking the amount or quantity of the defects, no elaborate system is needed, but with those concerns which make a variety of products and which employ different grades of labour, the expense incurred by defective work may be a very serious drain upon profits.

Defective work will largely arise through carelessness on the part of an employee, whether in setting up his machine, performing a particular operation, or for any other reason. On the other hand, defective work may be caused by the management or foremen if verbal instructions are given, and in such cases the operatives must not be blamed. The collection and summarizing of all expenses incurred through defective work should, therefore, be carried out in such a manner that the cause is shown as well as the total cost.

With some concerns a special staff may be engaged upon the rectification of spoilt work and the collection of the cost then becomes a comparatively easy matter. This method, however, is only practicable in certain of the process industries.

When a variety of standard products is being made, special service orders should be set up and the time and materials relating to such defects or their rectification charged to them, and at the end of a cost period the total of such orders may be dealt with by any of the following methods—

1. Transferred to the Departmental Expense Account.
2. Spread over the cost of the products concerned.
3. Regarded as a loss, and after showing the expense against the department or product concerned, the amount transferred to profit and loss.

With regard to defects which arise in connection with special articles made against a customer's order, the cost should be shown as a separate item against the order in question. (See also MANUFACTURED GOODS—REJECTION OF.)

DELIVERY EXPENSE. (See SELLING EXPENSES.)

DEPARTMENTAL COSTING. (See COST FINDING—METHODS OF.)

DEPARTMENTALIZATION. The manufacturing departments of a business require to be classified before there can be decided the method of cost finding to be used. With practically all kinds of industries it will usually be necessary to adopt more than one of the methods of cost finding in the same factory; for instance, the process method may be required by some departments owing to the special nature of the work done by them, whereas the remainder may use the job costing method.

The classification of the manufacturing departments is important, since it forms the basis for the cost accounts and cost returns, also cost control and reconciliation. The grouping of each element of cost by departments enables costs to be collected, proved, and reconciled with a greater degree of accuracy than would be the case if the expenditure in materials, labour, and expenses were dealt with in total.

The departments into which any one business can be divided will not be the same in every case, as each factory will require special treatment, but in general manufacturing departments may be classified into three groups—

(1) Producing or manufacturing departments.
(2) Service or non-producing departments.
(3) Miscellaneous departments.

(1) **Producing Departments.** The producing or manufacturing departments of a factory will include those that are directly engaged in the making of saleable products. The activities of these departments embrace all work performed on materials that are converted or formed into the finished product, as well as the work upon materials or component parts that may be placed into the part finished stores and requisitioned at a later date for final assembly into the complete product.

When deciding upon the classification of the producing departments due consideration must be given to the various kinds of work performed on each article, the relation one operation or process has to another, and the unit of output that will be used as the basis for calculating its cost.

The actual number of departments and the designation given to each will depend upon the size of the factory and nature of the work done. The following examples will be sufficient to indicate in a general manner the principles of departmental classification, but it should be noted that if two factories are making the same product and both use the same process of manufacture, each will require a different classification, as the conditions that prevail at the one factory will not necessarily apply to both.

ELECTRICAL ENGINEERING—
- Machine Shops, such as Turning, Milling, Drilling, Planing, etc.
- Foundry, which may be further departmentalized into Melting, Moulding, Coremaking, and Finishing Departments.
- Winding Department, which may be further divided into Coil Winding Department, Armature Winding Department, etc.
- Plating Department.
- Paint Department.
- Lacquer and Enamelling Department.
- Hardening and Annealing Department.
- Vulcanizing Department.
- Assembly Department.
- Inspection Department.
- Test Department.

READY-MADE CLOTHING BUSINESS—
- Cutting Department.
- Machining Department.
- Hand Sewing Department.
- Trimming Department.
- Inspection Department.
- Pressing and Packing Department

PAINT MANUFACTURING—
- Heavy Grinding Department.
- Heavy Mixing Department.
- Light Grinding Department.
- Light Mixing Department.
- Thinning.
- Tinting.
- Filling Department, which may be further departmentalized into Straining, Filling, Sealing Containers, and Polishing.
- Labelling.

COTTON SPINNING AND WEAVING—
- Blowroom (or Cleaning).
- Carding.
- Winding.
- Warping.
- Sizing.
- Twisting.
- Weaving

TIN BOX AND CANISTER MAKING.
(Small Box Work.)
Stamping Department.
Beading Department.
Lipping Department.
(Can and Canister Work.)
Cutting Department.
Notching Department.
Folding Department.
Rolling Department.
Grooving Department.
Soldering and Embossing Department
Flanging Department.
Stamping Department.
Double Seaming.
Beading.
Printing, comprising departments as follows:
Coating.
Colour Printing.
Varnishing and Lacquering.
Stoving.

(2) **Service Departments.** Service departments are sometimes referred to as "expense" departments. Service departments are not directly engaged upon the manufacture of a product, their duties being to render a service to the producing departments.

The exact size and specific function of these auxiliary departments will vary with the size and number of producing departments, and the nature of the work performed by them.

Examples of service departments—
Power Department.
Millwrights' Department.
Progress Department.
Planning Department.
Inspection or Viewing Department.
Receiving Department.
Stores Departments.
Drawing Office.
Purchasing Department.
Wages Department.
Estimating Department.
Rate-fixing Department.
Employment Department.
Welfare Department.

The cost of maintaining all service departments, which is ascertained by means of a system of service orders, is charged to expense accounts of the producing departments, and recovered in costs by means of an expense rate.

(3) **Miscellaneous Departments.** In almost every factory there will be one or more departments whose work will be partly for production and partly for service; for example, the toolroom may manufacture small tools for general purposes as well as special tools for use on individual works orders. In the former case the cost is a charge to the factory expenses, and the latter a direct charge to the particular works order for which the tools were specially made. Other examples of departments whose work is partly service and partly productive are the Carpenters' Department, Millwrights', Repair Shop, Experimental Department, Blacksmiths' Shop, Pattern Shop, etc.

The carpenters may be engaged in making packing cases for special orders in addition to cases, etc., for general use, also work on fixtures and fittings, benches, etc., which may be a charge to repairs and maintenance or to capital; similarly, the pattern shop may be engaged upon patterns both for special orders and for general use.

Departments of this nature are best classified as miscellaneous departments, as the cost of maintaining them will require slightly different treatment from either the producing departments or those that are purely service departments.

The materials used by miscellaneous departments and the wages paid, etc., will be charged either to service orders or production orders, according to the nature of the work performed. Work on service orders will then be charged to the producing departments or to capital, if new plant, etc., has been made.

In some instances the departments mentioned above are more conveniently classified as producing departments, and in such cases care must be taken to ensure that they receive credit for both direct and indirect work.

The correct departmentalization of any business is a very important factor, as it forms the only basis or foundation upon which there can be built a reliable and economical method of cost accountancy. Too much attention, therefore, cannot be given this subject when dealing with the installation or reorganization of any costing system.

DEPARTMENTAL RATE METHOD OF RECOVERING EXPENSES. The term "departmental rate" is generally and erroneously used as indicating a particular method of recovering expenses in costs in just the same manner as one may refer to the direct labour hour method, the percentage on direct labour method, the machine rate method, or the percentage on prime cost method. Strictly speaking, the term has reference to the manner of application or operation of a "method" rather than a method itself. For instance, there may be used the direct labour hour method on the basis of one general hourly rate for the whole factory, whereas on the contrary a separate hourly rate may be used for each department, and again the percentage on direct labour method may be applied as one general percentage rate or as a separate percentage rate for each department. Whenever any of the above or other methods are applied on a departmental basis, the use of the term "departmental rate" is not only ambiguous but liable to be very misleading.

The desirability of applying any method of recovering expenses upon a departmental basis will depend upon the nature of the articles or products made and the method of manufacture. With those cases where the work performed in each department is uniform in character, the several methods *may* be applied as one general rate over the whole factory, but where machinery is used to a varying degree in one or more departments, or when conditions throughout the factory are not uniform, it is generally found necessary to use different rates for each department.

The nature of manufacturing operations in almost every factory is such that a general expense rate should rarely be used, as one will seldom find that conditions are uniform throughout all departments. With engineering works especially the work performed will vary to a considerable extent, some of the products requiring the use of machinery throughout, whereas others will only need the use of little or no machinery. When such conditions prevail, the recovery of the factory expenses in costs on the basis of one general rate for the whole factory will obviously produce incorrect and misleading costs, as the article or process which requires the use of expensive machinery should have charged to it a greater proportion of the factory expenses than one which may be all hand work or partly hand work and partly machine work.

When the process method of cost finding is used, the departmentalization of the factory expenses in the majority of cases will follow as a natural sequence with the costing operations.

Percentage on Direct Labour. The recovery of factory expenses by this method, and using a separate rate for each department, will be carried out in the manner indicated under its title heading, excepting that in this instance the total factory expense will be analysed to departments.

Assuming that the factory expenses total £151,050 and direct labour £159,000, the expense rate will be calculated for each department as follows—

		DEPARTMENTS.				
		A.	B.	C.	D.	Etc.
	£	£	£	£	£	£
Total Factory Expense	151,050	25,000	40,000	30,000	56,050	—
Total Direct Labour	159,000	30,000	50,000	25,000	54,000	—
Expense Rate	—	83%	133%	120%	104%	—

The amount of factory expenses to be recovered on each job or process would, therefore, be ascertained by adding to the amount of direct labour of a department a sum calculated on the percentage rate applicable to the department in question, as follows—

	£	s.	d.	£	s.	d.
Direct Materials				123		
Direct Labour—						
Dept. A.	50	–	–			
Dept. B.	45	–	–			
Dept. D.	12	–	–			
				107		
Factory Expenses—				230	–	–
Dept. A. 83% on £50	41	10	–			
Dept. B. 133% on £45	59	17	–			
Dept. D. 104% on £12	12	9	7			
				113	16	7
TOTAL FACTORY COST				£343	16	7

(See also PERCENTAGE ON DIRECT LABOUR METHOD OF RECOVERING EXPENSES.)

Percentage on Prime Cost. The application upon a departmental basis of the percentage on prime cost method can seldom be done, as the value of materials used by each department will rarely, if ever, form an equal part of the cost of every department through which the product passes. Furthermore, as the costs of a department may only comprise labour and expenses, the prime cost method can practically be dismissed as a method not lending itself to departmentalization.

Direct Labour Hour Method. The direct labour hour method will usually be applied on a departmental basis, because the use of a general hourly rate for the whole factory will not give any better results than the percentage on direct labour method. It should be noted, however, that in the majority of cases the direct labour hour rate must be calculated separately for each department, if greater accuracy than that given by the percentage method is desired. Departmentalization in this instance is almost implied by the method itself, because the time taken on the job is the basis of recovery.

The calculation of a departmental hour rate is very simple and proceeds upon similar lines to that given above for the percentage method, excepting that in this instance the number of direct labour hours of all the direct workers engaged in each department become the divisor as follows—

		DEPARTMENTS.				
		A.	B.	C.	D.	Etc.
	£	£	£	£	£	£
Total Factory Expenses .	151,050	25,000	40,000	30,000	56,050	—
Direct Labour Hours . .	—	250,000	640,000	248,276	373,666	—
Expense Rate per Hour .	—	2/-	1/3	2/5	3/-	—

The amount of factory expense to be recovered on each job is ascertained by multiplying the number of direct labour hours spent on the job by the department's expense rate, e.g.

	£ s. d.	£ s. d.
Direct Materials		105
Direct Labour—		
Dept. A.	48 – –	
Dept. C.	39 – –	
Dept. D.	15 – –	
		102
		207
Factory Expense—		
Dept. A. 491 hours at 2/- . .	49 2 –	
Dept. C. 280 hours at 2/5 . .	33 16 8	
Dept. D. 120 hours at 3/- . .	18	
		100 18 8
TOTAL FACTORY COST .		307 18 8

Machine Rate Method. The machine rate method can rarely be used as the only basis for recovering the whole of the factory expenses, as there will invariably be one or more departments that will be all hand work or partly hand work and partly machine work in addition to those departments that are entirely composed of machine work. A separate method is generally used, therefore, for recovering those expenses which are not capable of direct allocation to the machines, and in this direction the machine rate method is generally used in conjunction with the direct labour hour method.

The use of a machine rate implies departmentalization in most cases, especially when the departments coincide with the various types or batteries of machine tools. With some concerns, however, all the machines may be located in one part of a building, and in such cases a " department " may be a group of machines. On the other hand, if a separate machine rate is used for the individual machines, the question of departmentalization will chiefly affect the general shop expense rate, i.e. the direct hourly rate.

The application of the machine rate method is fully described under its heading, and reference should be made thereto.

DEPARTMENTS. The term " department " as usually employed carries a somewhat loose significance, and may mean anything from a whole building down to a few square feet in a small shed or room. It may mean a division of activity ; take, as example, Power Department or, in the case of non-engineering industries, the Repair Department, the latter generally being a machine shop forming the headquarters of the repair staff. Generally, there is a Stores Department in most works and this may, or may not, be identified with a single building. Different productive shops or the location wherein a particular process or operation is carried on, are called departments, and it sometimes happens that more than one such productive department are covered by the same roof.

Such terms as " Cash Department," " Purchasing Department," " Wages Department " have no other signification than to indicate clerical work connected with cash, purchasing, and pay respectively. " Stores Department " similarly means the whole system of handling, receiving and issuing, and the keeping or storage of materials or goods. The " Cost Department " means the whole of the activity covered by the cost accountant. The " Power Department " includes all activity relating to the generation and transmission of power—steam or electric. These latter departments are called "expense" or "service" departments, rendering service to all, or any manufacturing departments. The cost of conducting them is ultimately distributed over the production or manufacturing departments. It is advisable to split up manufacturing activity into as many departments as are reasonably required by the natural processes of production. For this purpose it may often be necessary to consider one building as containing several departments.

DEPARTMENTS—EXPENSE. (See SERVICE DEPARTMENTS.)

DEPARTMENTS—PRODUCTION. (See MANUFACTURING DEPARTMENTS.)

DEPARTMENTS—SERVICE. (See SERVICE DEPARTMENTS.)

DEPOSIT ACCOUNTS—INTEREST ON. (See BANK DEPOSITS—INTEREST ON.)

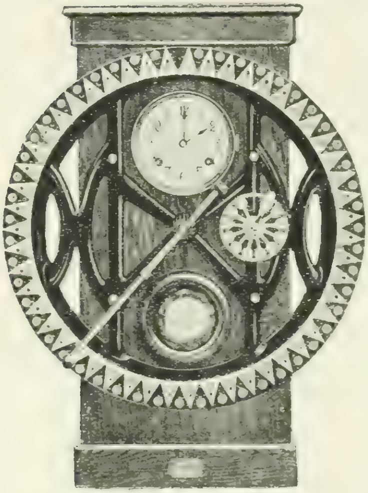
DEPRECIATION. The gradual decrease in value of an asset from any cause. The amount of depreciation "written off" each year in the financial accounts will form part of the establishment expenses, and the allocation or apportionment of the amount to the factory, selling, and administrative sections of a business will depend upon the kind of assets and their relation to the respective sections. For instance, the whole of the depreciation on producing machinery is a charge to factory expense, whereas the amount relating to buildings will be allocated to the three sections on the basis of space occupied.

Reference has been made to the amount of depreciation "written off" in the financial accounts each year, and in this direction it should be noted that circumstances may alter cases, as when a company has made large profits and a very liberal amount of depreciation is charged to Profit and Loss Account, while on the contrary an insufficient amount may be "written off" during periods of trade depression. When such conditions prevail and also in those cases where the plant and machinery assets, for instance, may be grouped into one account and a general percentage rate used, it is desirable that the various assets be classified and a correct rate fixed for each class or piece of equipment.

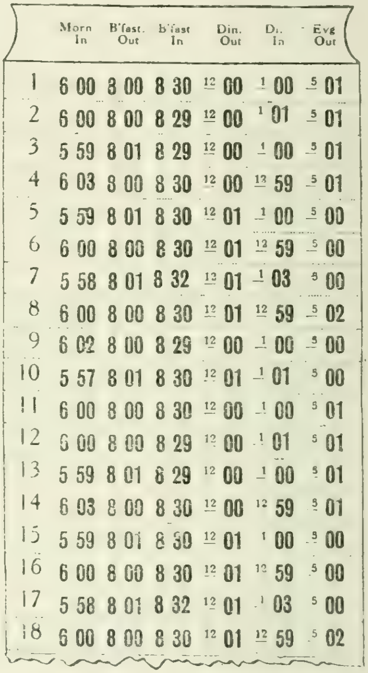
In the majority of instances it is best to use the "straight line" method when calculating depreciation, and whilst the question of depreciation cannot be considered separately from that of repairs and maintenance, it will nevertheless be desirable that the amounts relating to each be recorded separately in the Costing Department.

When the amount of depreciation included in the financial accounts does not agree with the figures used in the cost accounts, a Depreciation Adjustment Account should be opened in the Cost Ledgers for convenience of reconciliation.

The nature of the plant assets belonging to some concerns, however, may be such that one general rate can be used for each class, and in these circumstances the Adjustment Account may not be necessary.



THE DEY AUTOMATIC TIME RECORDER (see page 115.)



	Morn In	B'fast. Out	B'fast In	Din. Out	Di. In	Evg Out
1	6 00	8 00	8 30	12 00	1 00	5 01
2	6 00	8 00	8 29	12 00	1 01	5 01
3	5 59	8 01	8 29	12 00	1 00	5 01
4	6 03	8 00	8 30	12 00	12 59	5 01
5	5 59	8 01	8 30	12 01	1 00	5 00
6	6 00	8 00	8 30	12 01	12 59	5 00
7	5 58	8 01	8 32	12 01	1 03	5 00
8	6 00	8 00	8 30	12 01	12 59	5 02
9	6 02	8 00	8 29	12 00	1 00	5 00
10	5 57	8 01	8 30	12 01	1 01	5 00
11	6 00	8 00	8 30	12 00	1 00	5 01
12	6 00	8 00	8 29	12 00	1 01	5 01
13	5 59	8 01	8 29	12 00	1 00	5 01
14	6 03	8 00	8 30	12 00	12 59	5 01
15	5 59	8 01	8 30	12 01	1 00	5 00
16	6 00	8 00	8 30	12 01	12 59	5 00
17	5 58	8 01	8 32	12 01	1 03	5 00
18	6 00	8 00	8 30	12 01	12 59	5 02

TIME RECORD (abridged.)

A detailed record of depreciation relating to each piece of equipment should be kept, and the form for this purpose may be ruled similar to the plant record card shown under that heading.

The incidence of depreciation is very similar to that of repairs and maintenance and the principles of allocation or analysis will, therefore, follow the lines already indicated under that heading.

DEVELOPMENT EXPENSES. (See Experimental and Development Expenses.)

DEY AUTOMATIC TIME RECORDER. These machines are made to register the time of employees in groups of 50, 100, and 150. The time of each employee upon entering or leaving is recorded in plain, unalterable figures on a line opposite the number of the employee, giving a daily, weekly, fortnightly or monthly record, as desired. The time records are printed on a paper sheet or chart placed on the drum inside the machine, and show the exact time every person arrives and departs.

The weekly automatic machines require no attention for a whole week, the mechanism moving from " in " to " out " and from day to day automatically.

The irregular records, that is to say the records of late arrivals, those leaving early, and working overtime, are automatically shown in red ink, distinct from the other records, which are in blue.

The daily time sheet is ready for pay roll when it leaves the register, and can be pasted or filed into a cover, forming a complete Time and Wages Book. The weekly combined time and wages sheet gives the actual time worked for a week, with wage analysis columns for total hours, rate and wages due, providing for insurance deductions, minimum wage returns, etc.

DIEMER COMBINED BONUS AND PREMIUM METHOD OF REMUNERATING LABOUR. The daily rate is guaranteed, and it is calculated by taking 70 per cent of the time taken, adding to it 50 per cent of the standard time, and multiplying the sum by the hourly rate. Bonus starts at 100 per cent when there is a " step " of 20 per cent. The increase above this point is considerably lower than most other systems.

It is not very strong in its effects, but if conditions are not completely standardized, it is a comparatively safe and easy plan to install.

The cost per piece produced is low—subject to it being possible to keep the workers from falling back on the guarantee. (See also Remuneration of Labour—Methods of.

DIFFERENTIAL PIECE WORK. (See Taylor Differential Piece Rate.)

DIRECT CHARGES. The total expenses of a business which constitute the third element of cost are subdivided into two groups; firstly, there are expenses that have been specially incurred for specific orders and can, therefore, be charged direct to a specific article, order or process ; and secondly, the expenses which have been incurred in the general running of a business and which can only be dealt with as a general charge over the whole business.

The former are known as direct expenses and the latter as indirect expenses.

Direct expenses may include such items as the cost of any assistance or facilities used for a special article, order or process. For instance, special travelling and other incidental expenses, heavy charges incurred for carriage on materials or parts, or any expense incurred in the hire of special machinery, such as a portable crane or an engine, are a direct charge to an order or process.

Direct expenses are sometimes referred to as direct charges, but the former term is preferable if uniformity of costing terminology is desired. (See also ELEMENTS OF COST.)

DIRECT COSTS. (See DIRECT EXPENSES.)

DIRECT EXPENSES. Any expenses that have been specially incurred for specific orders and can, therefore, be charged direct to the specific job, operation or process. Such expenses will include such assistance or facilities used for a special order or process, i.e. a portable crane or engine or scaffolding may be hired for a particular job. Furthermore, special charges are often incurred when carriage has to be paid on special materials or parts obtained for an order. In such cases the carriage, other than small sundry amounts, is a direct charge to the job, order or process.

DIRECT LABOUR. The labour used in performing work directly upon a saleable article, and which can be measured and correctly allocated to the article, order or process.

The labour hired by a manufacturing concern will generally be used in two ways. It may be employed in performing work directly upon a saleable article or product, or it may be usefully employed on such work as sweeping and cleaning, general labouring, carrying materials from the stores to the work benches, repairing the plant and machinery, or in supervising the workers of a department.

In the case of the former, the labour employed in performing work " directly " on a saleable product can be measured and correctly allocated to the article. Such labour is therefore classified as " direct labour."

With the latter, however, it is not possible to charge it to any specific article or order on the basis of the work done towards its completion. Such labour is, therefore, classified as "indirect labour."

DIRECT LABOUR HOUR METHOD OF RECOVERING EXPENSES. The computation and recovery of expenses as a rate per direct labour hour are based on the time taken to produce an article. This method is very similar to the percentage on direct labour method, excepting that expenses are recovered at a rate per direct labour hour instead of by a percentage on the amount of direct wages paid ; in other words, the number of hours becomes the basis instead of the amount paid for the hours.

The work involved in the calculation of an hourly rate is represented by the following formula—

$$\frac{\text{Estimated total of expenses for period}}{\text{Estimated total of direct labour hours for period}}$$

The estimate of expenses and direct labour hours may be prepared by using the figures of previous accounts or calculated according to the maximum or reduced output capacity of the factory, and the principles involved in estimating the total expenses for the year or other period are fully dealt with under the general consideration of "establishment expenses."

A close estimate of the total direct labour hours can only be arrived at when all the factors which enter into the estimate are dealt with individually and scientifically, and as the correct application of this method depends upon the precision with which this estimating is carried out, attention should be given to every detail.

The direct labour hour method may be calculated as one general rate for the whole factory or a separate rate can be used for each department. If a general rate for the whole factory is used, however, the method offers practically no advantage over the percentage on direct labour method, but when applied on a departmental basis it will give more accurate results.

The advantage of this method over the percentage on direct labour or prime cost methods lies chiefly in the direction of the time element between a fast worker and a slow worker ; for instance, if two men paid by the piece work method are engaged upon similar work and one completes his job in 30 hours, the other in 20 hours, the slow worker will use more light, power, supervision, etc. The amount of expense charged to each job under this method will, therefore, be more in proportion to the extent to which power, supervision, and the various facilities or services have been used, as shown by the following examples—

WORKER NO. 1.	£	s.	d.	WORKER NO. 2.	£	s.	d.
Materials . . .	3		–	Materials . . .	3		–
Direct Labour—				Direct Labour—			
Piece Work Price .	2	10		Piece Work Price .	2	10	
Time taken, 20 hrs.				Time taken, 30 hrs.			
	£5	10	–		£5	10	
Factory Expenses—				Factory Expenses—			
20 hrs. at 2/6 per hr.	2	10	–	30 hrs. at 2/6 per hr.	3	15	–
TOTAL COST .	£8		–		£9	5	–

If the percentage on direct labour method had been used, the percentage addition would be the same in each case.

It will be seen from the above that providing the work done in any one department is uniform in character, that is, either all hand work or all machine work, this method will give accurate results when applied upon a departmental basis, but in those cases where machinery is used to a varying degree in one or more departments, the method makes no allowance for a job that requires the use of machinery or one that may be all hand work. This is a serious fault, because an article which will need the use of machinery should have charged to it a greater proportion of the factory expenses than one which requires the use of little or no machinery.

In order to overcome the one objection to the method, the expenses of those departments which use machinery are sometimes divided, and a separate rate calculated for both hand work and machine work; in other words, the factory expenses are recovered by a combination of the direct labour hour method and the machine rate method.

In some cases, however, the departmental expenses that go to make up the "supplemental or super rate," that is, the rates applicable to machine work only, may all be grouped for each department, and a "general" supplementary rate used for all the machines in the one department. This method of fixing the supplementary rate, however, will only completely eliminate the weakness mentioned above, if all the machines in each department perform similar operations and are of the same size and type, etc. With those factories where a variety of machine tools are used in any one department, the supplementary rate should be fixed on the same basis as machine rates, and a separate rate used for each machine or group of machines.

When applied in conjunction with a supplementary rate for the machine expense, the direct labour method is undoubtedly one of the best methods that can be used if both hand work and machine work is carried on in the same factory, as due allowance will then be given to all the varying factors appertaining to the majority of such concerns—factors which may be summarized as follows—

(1) The time element of the job.

(2) Work which may wholly or partly require the use of machinery.

(3) Work which is partly hand work and partly machine work.

(4) Jobs which are all hand work.

When the combined method is used, the factory expense will be added to costs in two amounts, but the extra amount of clerical work involved is much less than may appear at the outset, because on the one hand the various rates will be calculated only once in each year, if they are based on the normal maximum output capacity of the factory, which it may be noted is the correct basis.

On the other hand, the recording of the number of hours against each job or order is quite a simple matter if the routine in connection with the booking of time to jobs or processes is properly carried out.

DIRECT MATERIALS. Such materials as are worked upon for the specific purpose of changing the form or shape, or combined with other materials in order to produce a saleable product are known as direct materials, as the manner in which they are used is such that they can be correctly measured and charged direct to an article, order or process.

The materials consumed by a manufacturing concern are classified under two broad headings, viz., " direct materials " and " indirect materials."

DIRECTORS' FEES. The fees paid to directors in connection with the attendance at board meetings form part of the establishment expense, and are allocated to administrative expense.

DIRECTORS' SALARIES. The salaries paid to directors who occupy a managerial position form part of the establishment expenses of a business, and are allocated according to the nature of the word done ; for instance, if the work performed is confined to the factory departments, it would be a charge to factory expenses.

If a director's activities refer to more than one section of the business, the salary is apportioned over the respective departments according to the extent it is estimated each benefit from his services.

A salary or fee paid to a director in connection with any special work which the board have requested him to carry out, and which may extend over a long period of time, should be dealt with upon the same principle as above, but any special work of short duration is best charged to administrative expenses.

DIRECT PURCHASES. Materials or parts specially purchased for use on a specific job, order or process, are dealt with as a direct charge to the job or order for which they are required. Materials which are capable of this direct analysis will not include general materials or stores items that are required for general production purposes.

DIRECT WAGES. (See DIRECT LABOUR.)

DISCOUNTS ALLOWED. The total amount of discounts allowed to customers on settling their accounts may sometimes be deducted from the total sales for the period, in which case the item will not affect the cost accounts. When discounts allowed are shown separately in the accounts, however, the item may then be dealt with by including it among the sales expenses. Most concerns prefer that all cash and monthly discounts allowed to customers be regarded as a deduction from the sales, and this procedure is the more correct.

It must be noted that the item " discounts allowed " will not include the ordinary trade discounts, which are deducted from the sales invoices at the time they are made out, but only such allowances as are made when paying accounts and which are usually known as cash discounts.

With some concerns a Discount Account is operated in the financial books which receives discounts both allowed and received, and in such cases the balance of the account will be carried forward to the Profit and Loss Account, and the item regarded as a debit or credit to administrative expenses in the cost accounts. The Discount Account may, however, be analysed and dealt with by either of the methods described above.

DISCOUNTS RECEIVED. The total cash discounts received which are deducted at the time of paying the various creditors' accounts may be dealt with either—

(*a*) As a credit to establishment expense.

(*b*) As a deduction from the total purchases.

When discounts received are credited to expenses, they may be apportioned over the Factory, Selling, and Administrative Departments, according to the value of purchases made on behalf of the respective sections.

If the expenses incidental to the handling and purchasing of materials are recovered in costs as a separate item to the remaining factory expenses, the amount of discounts would then be credited to material expense.

With small concerns, and in all cases where the total purchases and the amount of discount received are not large, the item is best dealt with by being allocated in total to administrative expenses.

The deduction of discounts from the value of purchases may be the procedure of some concerns, but the use of Material or Stores Control Accounts will render this method unsuitable.

With some concerns a Discount Account may be operated in the financial books, and in such cases both discounts received and discounts allowed will be transferred to this account, and the balance carried forward to Profit and Loss Account. The item may then be regarded as a debit or credit to administrative expense. Alternatively, the account must be analysed and dealt with by either of the methods described above.

Discounts received, and dealt with as above, only refer to "cash" discounts which are deducted from the various creditors' accounts at the time of payment, and not the ordinary or trade discounts which are made on the purchase invoice.

DISTRIBUTION COSTS. (See SELLING EXPENSES.)

DIVIDENDS. The amount distributed by a company to its shareholders by way of dividends is an allocation of profits and must not, therefore, be included in the cost accounts.

DRAUGHTING—EXPENSE OF. The basis of distributing the expense incurred in connection with draughting will depend upon the total amount involved. With the small concern and in all cases where the amount of this item is not large, the total may be apportioned over the factory and selling expenses, according to the extent it is estimated each benefits by the work of this department. If the drawing office is only engaged upon the sketching of drawings for the factory, the total amount should then be charged to factory expenses.

With large concerns it may be desirable to provide the means of obtaining direct allocation of this expense item, and in such cases a method of booking time to the respective jobs should be introduced. Draughtsmen engaged on special work may book their time to the job number concerned, and ordinary routine work to a service order number. By this means the amount of time spent in preparing drawings for the factory will be ascertained. as also time relative to drawings for estimating for the Sales Department, etc.

The total expenses of the drawing office, which will include all drawing materials, etc., in addition to salaries. must be ascertained and a rate per hour calculated.

DRAWING OFFICE EXPENSES. (See Draughting—Expenses of.)

ELEMENTS OF COST. Every disbursement made or expenditure incurred to provide the material. labour, and facilities for manufacturing up to the point of the completion of an article or process must be comprised in the true cost of production. and the technical conception of cost practically rules out the possibility of a " cost " being comprised of one element alone.

In all cases a " cost " is the sum of three groups of components or elements, viz., the purchase price of material, the cost of the hire of labour, and the value of other disbursements made or expenditure incurred in achieving the desired product or result. The elements of cost are, therefore. classified into three main groups, and are known as—

(1) Labour.
(2) Materials.
(3) Expenses.

The labour hired may be utilized in two ways ; it may be employed in performing work " directly " upon a saleable article or product, or it may be usefully employed in such work as sweeping the shop floor, repairing the plant and machinery, attending to the issue of materials from stores, or in supervising all the workers in a department.

In the case of the former the labour used in performing work directly upon a saleable article can be measured and correctly allocated to the article, and such labour is classified as " direct " labour, but in regard to the latter it is not possible to charge this labour to any specific article, process or order on the basis of the actual work done towards its completion, although without such labour as this it is probable that the direct labour could not have been applied with equal efficiency. Such labour is, therefore, classified as " indirect " labour.

In the case of materials there is an exact parallel, certain materials may be worked upon for the specific purpose of changing the form or shape or combining with other materials in order to produce a saleable product. Such materials are known as " direct " materials, as the manner in which they are used is such that they can be correctly measured and charged direct to the article, process or order.

There are, however, certain other materials which cannot be so easily measured and charged direct to the article or order, but which are necessary if the workmen are to complete their tasks. Such materials may include oil, waste, emery paper, small perishable tools, solder, chalk for polishing, belting, and sundry items used for the maintenance of the plant and buildings, etc., and because they cannot be charged direct to each article or order, they are classified as " indirect " materials.

The expenses of a business are also subdivided into two groups: Firstly, there are the expenses that have been specially incurred for specific orders and can, therefore, be charged direct to the specific job, operation or process ; and, secondly, the expenses which have been incurred in the general running of a business, and which can only be dealt with as a general charge over the whole business.

The former are known as " direct " expenses and the latter as " indirect " expenses.

Direct expenses may comprise such items as the cost of any assistance or facilities used for a special order or process ; for instance, a portable crane or special machinery may be hired for a particular job, special travelling and other expenses incurred or heavy charges for carriage on materials or parts, special draughting, etc., and all other items which are capable of being charged direct to the order.

Indirect expenses will comprise postages, stationery, telephones, rates and taxes, salaries of office departments and departmental managers, depreciation, insurance premiums, and all cash disbursements and book charges which cannot be directly chargeable to any one process or order.

The subdivisions of the three elements of cost are grouped under two main headings, namely—

(*a*)	Direct labour.	(*b*)	Indirect labour.
	Direct materials.		Indirect materials.
	Direct expenses.		Indirect expenses.

The sum total of group (*b*) comprise the establishment expenses of a business. The elements of cost are again grouped into prime cost, factory or manufacturing cost, and selling and distribution costs, and for this purpose the total of group 2 is allocated or apportioned over the manufacturing, selling, and administrative sections of the business.

Chart Showing Distribution of the Establishment Expenses of a Business

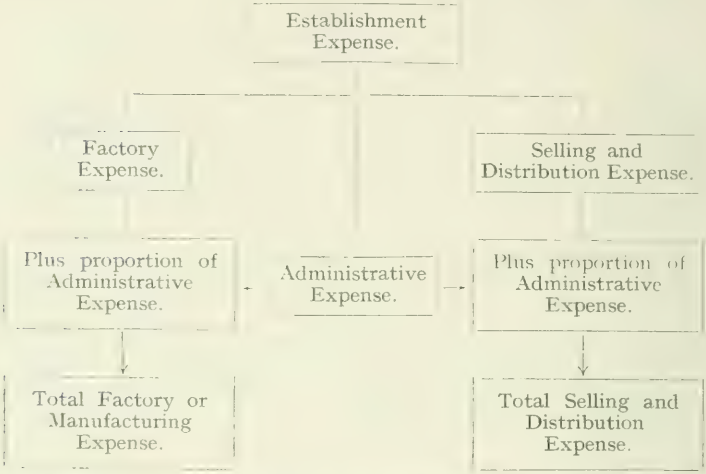
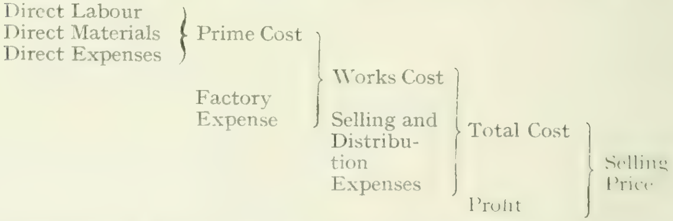

Establishment Expense.
Factory Expense.
Selling and Distribution Expense.
Plus proportion of Administrative Expense.
Administrative Expense.
Plus proportion of Administrative Expense.
Total Factory or Manufacturing Expense.
Total Selling and Distribution Expense.

Chart Showing the Elements of Total Cost and Selling Price



EMERSON EFFICIENCY BONUS. METHOD OF REMUNERATING LABOUR. By this method the daily rate is guaranteed. It is calculated by adding to the standard time 20 per cent of the time taken and multiplying by the hourly rate, and starts at 66·6 per cent of normal output.

Its principal disadvantage is that there is no special incentive at the point of standard production, and that workers other than the ambitious are inclined to fall back on the guaranteed rate.

It is a very mild form of incentive payment and could well be used as an intermediate step to the more advanced systems. It is specially good in the attention it pays to the time saved. The cost per piece produced is comparatively low, but, as with all systems in which the daily rate is guaranteed, the expectation of low cost is not always realized.

EMPLOYERS' LIABILITY INSURANCE. The amount of the annual premiums payable in regard to Common Law, Employers' Liability Act and Workmen's Compensation Act, is an item of establishment expense and is analysed to Factory, Selling, and Administrative Departments.

The analysis of this item is simple, as the premium is assessed on the amount of wages and salaries paid in the respective departments. according to the nature of the "trades" of the respective workers and, in regard to the clerical staff, the amount of salary paid to all employees earning up to £250 per annum.

EMPLOYEES—RECORD OF. A complete record of each worker's name and address, age, previous experience, the rate at which he is to be paid, etc., which is prepared at the time of the engagement.

The method of engaging labour will naturally differ according to the nature and size of the business. With small concerns the owner-manager will usually engage a worker as and when the necessity arises, but with larger factories this function is usually performed by a foreman or works manager, whereas in other cases there will usually be an Employment Department, whose chief duty is to ensure that a regular supply of the right type of labour is always available.

With the small concern a detailed record of the workers engaged may not be required beyond the usual wages book, but when a large number of workers are employed a proper record is necessary on account of the many changes that take place each week, both in regard to rates of pay and new workers. The record of employees for the smaller or medium-sized concern need not be so elaborate as that required by the larger concerns. In the one case a record either on an 8 in. by 5 in. card or loose sheet will meet all requirements, whereas with others, and especially with large factories, it will be necessary, on the engagement of a worker, to notify the respective departments in advance, because provision must be made for recording times and earnings, the payment of wages, and also for the allocation of work.

In such cases the record of employees will usually be arranged on the card system, the cards being ruled similar to the specimen given. The main part of the specimen form serves as the permanent record and the two slips are detached, the one being handed to the worker at the time of his engagement, and the slip headed "Planning Department" sent to that department, so that the necessary arrangements can be made in advance for the allocation of work.

The main part of the form, which is a card 8 in. by 5 in., may either be retained by the Employment Department, or if such a department does not exist, it should be kept by the wages section of the Cost Department. Assuming the latter to be the case, the wages section upon receipt of the employment form will prepare a gate card and send it to the gatekeeper, so that it will be available on the day the new worker commences. Upon the arrival of the worker at the factory, he hands his engagement slip to the gatekeeper, who then conducts him to the card racks, points out the position of his gate card, and instructs the worker how to register his time. The worker is then handed over to his foreman.

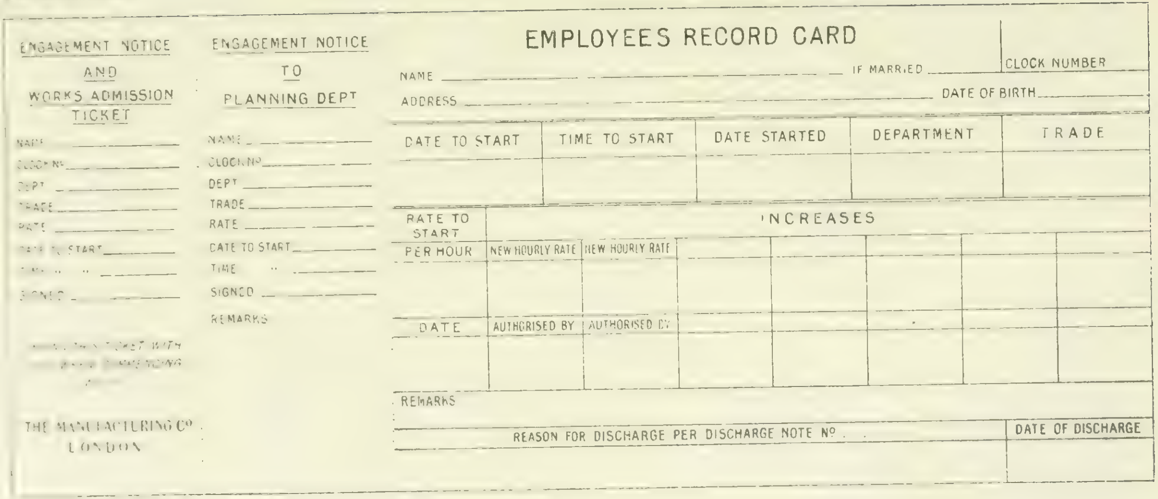
The employee's record card, retained by the wages section of the Cost Department, may be filed alphabetically under the name of the worker or numerically by clock number. Whichever method is chosen, it is usually found more convenient if the cards are firstly filed according to departments, and, secondly, by name or clock number. Whenever a worker is transferred from one department to another, the use of a card record method enables the worker's card to be easily removed and placed amongst those relating to his new department. Likewise as and when a worker leaves the services of the company, his record card can be removed and filed separately amongst the cards relating to other workers who have left the employ of the company.

On the reverse side of the record card is noted particulars of any character given by the worker's previous employer, also details relating to National Health and Unemployment Insurance cards, etc.

When the employee's record card is retained by the Cost Department, it is desirable that sufficient space be given for recording any changes in rates of pay, as they may be used as the medium for preparing the gate cards each week and in checking the rates of pay when calculating the amount of bonus or wages earned from the various job cards or work tickets.

On the other hand, if the record card is kept by the Employment Department, it may not be necessary to record

Form No. 43.



ENGAGEMENT NOTICE
AND
WORKS ADMISSION
TICKET

NAME ______
CLOCK Nº ______
DEPT ______
TRADE ______
RATE ______
DATE TO START ______
TIME " " ______
SIGNED ______

[illegible] THIS TICKET WITH
[illegible]
[illegible]

THE MANUFACTURING Cº
LONDON

ENGAGEMENT NOTICE
TO
PLANNING DEPT

NAME ______
CLOCK Nº ______
DEPT ______
TRADE ______
RATE ______
DATE TO START ______
TIME " ______
SIGNED ______
REMARKS

EMPLOYEES RECORD CARD

NAME ______ IF MARRIED ______
CLOCK NUMBER
ADDRESS ______ DATE OF BIRTH ______

DATE TO START	TIME TO START	DATE STARTED	DEPARTMENT	TRADE

RATE TO START	INCREASES						
PER HOUR	NEW HOURLY RATE	NEW HOURLY RATE					
DATE	AUTHORISED BY	AUTHORISED BY					

REMARKS

REASON FOR DISCHARGE PER DISCHARGE NOTE Nº
DATE OF DISCHARGE

the changes of rates thereon, as such information may be more suitably recorded on rate cards kept by the Planning, Rate Fixing, Costing, or other department.

EMPLOYEE'S WEEKLY PAY—RECORD OF. A record of the gross amount of weekly wages paid to each worker.

All classes of manual workers are assessed for income tax upon a quarterly basis and it is, therefore, compulsory for all firms to make a return showing the total earnings of all employees over the standard amount. To facilitate the compilation of this return a record card similar to the illustration on page 129 is used. A separate card is made out for each worker, and the gross earnings entered each week either direct from the gate cards or the pay roll.

The record cards are usually ruled to accommodate the thirteen weeks for each quarter in column form, and as both sides of the card can be ruled alike, they may remain in use for a period of two years.

The record of weekly pay can be put to many useful purposes in addition to that required for the income tax return. An examination of the cards, for instance, will immediately show whether a worker is maintaining his average weekly pay, and in those cases where the record shows a variation in the amount paid each week, the cause can easily be ascertained either by reference to the record of bonus or piece work earnings, or to the record of lost time or absentees. The many uses of the employee's weekly pay record, however, will depend upon the amount of statistics obtained and recorded by the costing system.

ERRORS—COST OF. (See Defective Work—Cost of.)

ESTABLISHMENT EXPENSE CONTROL ACCOUNTS. (See Cost Control Accounts.)

ESTIMATED COST. (See Cost Estimating.)

ESTABLISHMENT EXPENSES. The total expenses incurred in running the business both of the factory and offices, etc., which cannot be directly chargeable to any one product or process, but only apportioned according to some chosen method.

Establishment expenses comprise such items as rent, rates, taxes, postages, telephones, telegrams, salaries, repairs and maintenance of buildings, plant and machinery, indirect labour, indirect materials, depreciation, legal expenses, sundry office and works expenses, etc.

The establishment expenses of a business are of two kinds, viz., constant and variable.

Form No. 44.

EMPLOYEE'S WEEKLY PAY RECORD.

Employee's Name. .... Check No.. ..

Department ..

Address .... Trade.... ....

FIRST QUARTER.				SECOND QUARTER.				THIRD QUARTER.				FOURTH QUARTER.			
Week Ending	£	s.	d.	Week Ending	£	s.	d.	Week Ending	£	s.	d.	Week Ending	£	s.	d.
1				14				27				40			
2				15				28				41			
3				16				29				42			
4				17				30				43			
5				18				31				44			
6				19				32				45			
7				20				33				46			
8				21				34				47			
9				22				35				48			
10				23				36				49			
11				24				37				50			
12				25				38				51			
13				26				39				52			
TOTAL 1ST QUARTER £				TOTAL 2ND QUARTER £				TOTAL 3RD QUARTER £				TOTAL 4TH QUARTER £			

Card No. .... Total for Year Ending.................... 19 .... £ ....

Constant Expenses are those which do not vary directly with the volume of output or trade, such as rent, rates and taxes, fire insurance, depreciation of buildings, directors' fees, etc. ; and

Variable Expenses are the indirect expenses which fluctuate with the volume of output or amount of work done, and include such items as indirect labour, indirect materials, power, light and heat, repairs and maintenance, charges for water, sundry works expenses, works clerical assistance, salaries, commissions on sales and output, stationery, etc.

No feature of cost accounting is more difficult than the treatment of establishment expenses, and this item has received the least attention on account of the general and erroneous impression of its extremely elusive nature. If these expenses are dealt with in a correct manner, very great possibilities of savings are presented, as they can be calculated and scientifically controlled with a surprising degree of accuracy.

The correct treatment of this subject in most systems of cost accountancy will require that the total establishment expenses be subdivided, so that they can be dealt with in three or more groups, viz.—

(1) Factory expenses.
(2) Selling and distribution expenses.
(3) Administrative expenses.

This grouping of expenses is necessary, as by their division the correct proportion of all the indirect items can be charged to the respective departments, products or processes, and the actual cost of the Sales and Administrative Departments ascertained separately from the factory (or works) cost.

The work entailed in the treatment of this subject in a costing system will require to be done in the following stages—

(*a*) **Collection,** which refers to the collection and transfer of expenses from the financial or suspense accounts to the cost accounts.

(*b*) **Allocation,** which is the work of analysing each item of expense under its respective group (1), (2), and (3), as mentioned above.

(*c*) **Computation and Recovery,** which refers to the method by which the expense rate is calculated and recovered in the individual cost accounts.

For a detailed consideration as to the items which are chargeable to the factory, selling, and administrative groups, also the various methods of collecting, allocating, and recovering expenses in costs, see under their respective headings. The principles which govern the apportionment of each item of expense are dealt with under the title of the expense item.

Owing to the special nature of the items which comprise the establishment expenses of a business, they are generally dealt with by estimating the total for the year, and at frequent periods this estimate is checked by comparing the amount of expenses recovered in costs with the actual expenditure incurred. The necessity for this predetermination of expenses is due to the fact that facilities are used before the amount of the expense so incurred is known, and appears in the accounts as a liability.

The principles upon which estimates of expenses are generally prepared may be considered under three headings—

(1) By using the total expenses as shown in the Trading and Profit and Loss Accounts of the previous year.

(2) By estimating all expenses according to a reduced amount of business it is expected will be done during periods of trade depression.

(3) By basing the estimate of expenses on the full normal output capacity of the factory.

(1) **Using the Figures of Previous Accounts.** Estimating expenses by this method is extremely simple. For the very small workshop it will generally provide a fairly close estimate, as expenses are usually constant throughout the year. Variations in volume of output do not affect expenses in these cases to the same extent as with larger concerns, as the size of the shop and the small number of machine tools, etc., available will not permit of sufficient increase to materially affect expenses.

In the case of larger concerns, however, this method of estimating expenses will not provide a reliable estimate, as variations in trade or factory output will materially affect the total expenses to a far greater degree than would be the case with small workshops.

With the small workshop, therefore, and in certain cases where a seasonal trade is done, and when it is proved by previous records that the output, sales, and expenses over a period are fairly constant, this method may be adopted with fairly good results.

(2) **Estimates Based on Reduced Output.** The basing of expenses on an estimated reduced output is a method used when it is considered that all expenses must be recovered in

costs irrespective of the amount of trade done; for instance, during periods of trade depression, many concerns will assume that the total business they hope to secure may not be sufficient to keep their factory working at full normal capacity, i.e. full ordinary time, consequently their expenses must be fully recovered in costs by being spread over this reduced output.

When estimating the expenses under this method, it must be borne in mind that if it is assumed that the factory will only be working, say, three-quarter time, it does not necessarily follow that the expenses will be reduced in the same proportion; for instance, the "constant" expenses will not vary with the volume of output, therefore those items which comprise the "variable" expenses will only need consideration.

OBJECTIONS TO REDUCED OUTPUT METHOD. It is well to note that whilst all the expenditure incurred for a financial period will be charged against the total revenue obtained from sales, etc., in the ordinary financial accounts during that period, the treatment of establishment expenses in costs will require consideration from different aspects to that of purely financial accountancy.

The recovery of expenses in costs does not necessarily imply that *all* the expense must be recovered in the cost of goods produced for sale, but rather that the working of the costing system should show how and why the expense was incurred, and it is only by segregating all the unremunerative expenses, waste, and other losses from those expenses that have been legitimately incurred by actual production that the question of expense control can be correctly dealt with.

The recovery of expenses by the above method has, therefore, many disadvantages, and the chief ones may be stated as follows—

EFFECT ON PRODUCTION COSTS. One of the advantages that should be derived from a good system of costing is the ability to compare the expenses against the volume of production of one period with another, in order to ascertain whether production efficiency is being maintained, increased or decreased, whichever the case may be, and the general effect upon the cost returns will be that during periods of active production the costs of individual items will appear low, as expense rates will be based upon the full output capacity of the factory, whereas during periods of slack trade costs appear high, as expenses will then be recovered upon a less volume of production. Thus a varying output, which is beyond the control of the factory executives and workers, is allowed to affect the cost of work done by them.

When the factor of varying production is allowed to influence the amount of establishment expenses recovered in costs, it will easily be seen that it destroys the value of the cost records, and completely eliminates the possibility of comparison as it is almost a general fact that during periods of trade depression a factory is usually run more cheaply, comparatively speaking. The supervision of workers becomes more strict, with the result that operations performed or work done will be of a better quality, and generally completed in less time than when the factory is fully manned and supplied with more orders than it can comfortably complete whilst running full time.

COMPARISONS OF COSTS SPOILT. Comparisons of detail costs of an article or operation cannot be properly made if there is not taken into consideration all the three elements which have entered into its cost of production, and it will therefore be seen that if the factor of varying production is allowed to affect the factory cost of an article or operation simply by increasing or decreasing expense rates according to the volume of output, the question of comparison of costs becomes one that will mislead rather than assist the executives of a business.

An example will assist to further explain this particular point. In an engineering factory the machine shop will always provide instances where a variable output will appear to affect costs of production, despite the fact that the same time and the same quantity of materials are used for a particular article. The actual method by which factory expenses are recovered will not affect the position, as the result will be the same in each case, therefore for the purpose of illustration it is assumed that a machine rate is used and that the expenses, etc., are as follows—

MILLING DEPARTMENT

Total Expenses	£5,000		
Total Machine Hours when working two thirds ordinary time	40,000		
Machine Hour Rate	2/6 per hr.		
INDIVIDUAL COST—	£	s.	d.
W.O. 4567. Labour	50	–	–
Materials	45	–	–
	£95		
Machine Rate, 520 hrs. at 2/6	65		
	£160	–	–

The same cost during a period of active production would be—

Total Expenses	£5,000		
Machine Hours	60,000		
Machine Rate	1/8 per hr.		
SAME INDIVIDUAL COST—	£	s.	d.
W.O. 4567. Labour	50	–	–
Materials	45	–	–
	£95	–	–
Machine Rate, 520 hrs. at 1/8	43	6	8
	£138	6	8

The above illustration is sufficient to show that attempts at comparison of costs under the circumstances stated will not only be valueless, but the effect upon the future policy of a business may be such as will render it exceedingly difficult to obtain business.

LOSSES DIRECTLY DUE TO SHORT TIME NOT KNOWN. During periods of slack trade the actual losses which are directly due to the plant working short time will not be known, as the expense which is actually incurred by *working* plant is not separated from those expenses chargeable to *idle* plant.

The extent to which individual and total costs may be influenced by this cause is clearly indicated by the above example, and is sufficient to show that if manufacturing efficiency is to be accurately measured and compared with previous performances, the method provided must be such as will eliminate the factor of varying production from individual costs, so that "unearned" or "unabsorbed" expenses are not allowed to disguise the real facts. Expenses that are not chargeable or unabsorbed by current production represent the expense of maintaining idle plant, and are more directly regarded as a charge to profit and loss and not to production.

It follows from the above that if selling prices are based upon costs, tenders will be too high during slack periods and trade lost, whereas during periods of active production tenders will be low and at a time when better prices should be obtained owing to sufficiency of work.

(3) **Basing Estimates on the Full Normal Output Capacity.** The estimating of expenses upon the full normal capacity has many points of superiority over methods (1) and (2) above. This method has the double advantage in that it not only

enables correct costs to be obtained, but that once the true import of idle plant or unabsorbed expense is understood, it provides valuable information upon which the management is able to formulate a more comprehensive policy regarding manufacturing and selling, than is generally the case with the other methods.

PREDETERMINING EXPENSES. The predetermination of expenses for the ensuing period will be based upon the reduced or full normal output capacity of the factory, according to which of the above methods is used, and a close estimate can only be arrived at when all the factors which enter into the estimate are dealt with individually and upon a scientific basis.

The procedure to be followed in this direction will be very similar to that given for estimating output, etc., and as given in the description of the various methods of recovering expenses in costs, such as the percentage on direct wages method, etc. The basis of allocating each item of expense depends upon circumstances, and details and examples of these are given under the title of the individual items.

The detailed work involved in estimating expenses is very similar to that which is used when collecting and allocating, etc., the *actual* expenses each month or other period for the purpose of checking the estimated rates, the only difference, therefore, being that in this instance one will estimate the amount of each expense item, whereas in the other case mentioned the actual expenditure for the period is collected and allocated.

In dealing with the estimate, therefore, the items should firstly be entered upon an "expense allocation statement," and the amounts then allocated to sub-accounts in accordance with the general principles outlined under that heading, and, lastly, the expense rate ascertained so that expenses can be recovered in costs upon this basis.

ESTIMATING DEPARTMENT EXPENSES OF. The total expenses of maintaining an Estimating Department, which will include salaries, stationery, and the like, will form part of the establishment expenses of a business. The allocation of the amount depends upon whether the Estimating Department serves both the Factory and Selling Departments or the one section only.

In many cases the work of estimating, etc., will be carried out by an individual or department attached either to the Cost Department or Sales Department. If the former, the expense may conveniently be dealt with in the accounts of the Cost Department, but if the latter, the amount will be automatically allocated to selling expenses.

With some concerns, however, a separate Estimating Department will be maintained and the expense is then apportioned to the Factory and Selling Expense Accounts, according to the extent each benefits from the activities of the department.

ESTIMATING INDIRECT EXPENSES. (See ESTABLISHMENT EXPENSES.)

EXPENSE ADJUSTMENT ACCOUNTS. (See COST CONTROL ACCOUNTS.)

EXPENSE ADJUSTMENT ACCOUNT. (See COLLECTION OF EXPENSES.)

EXPENSE ALLOCATION STATEMENT. A statement showing how establishment expenses are debited to each department of a business. For an illustration of form see ALLOCATION OF EXPENSES.

EXPENSE ANALYSIS SCHEDULE. (See COLLECTION, also ALLOCATION OF EXPENSES.)

EXPENSE APPORTIONMENT. (See ALLOCATION OF EXPENSES.)

EXPENSE CONTROL ACCOUNTS. (See COST CONTROL ACCOUNTS.)

EXPENSE DEPARTMENTS. (See SERVICE DEPARTMENTS.)

EXPENSE, ESTABLISHMENT. (See ESTABLISHMENT EXPENSES.)

EXPENSE MATERIALS. A term that is sometimes used when referring to those materials that cannot be easily measured and charged direct to an article, order or process, but only apportioned according to some logical method.

Expense materials may, therefore, include sundry items for the maintenance of plant, machinery, and buildings, such as lubricating oil, belting, cotton waste, grease, and spare parts used in repairing the machinery, fuel, petrol, packing materials, solder, fluxite, emery paper, chalk for polishing, small perishable tools, and all such items used in manufacturing.

In some instances the term expense material may only be used in connection with those items which solely relate to the repair and maintenance of plant, and also as required by the various service departments, such as spare parts for machines, cutting and lubricating oils, paint, and the like for repairs to buildings, fuel for heating, etc., petrol, etc. The remaining items of this class of materials, i.e. chalk for polishing, flux for soldering, solder and the like as used by most engineering firms, and ink, etc., by printers, etc., are then classified as indirect materials. A distinction in this case is made between those sundry materials that are directly used in production, and which it will be noted cannot be directly allocated to individual jobs, processes or operations, and those items that may be termed expense or maintenance materials.

The necessity for this subdivision will only arise with very large concerns, and where the expenditure in regard to this class of material is exceptionally large. (See also MATERIALS—CLASSIFICATION OF.)

EXPENSE RATE. The established measure used for ascertaining the proportion of expense that is to be charged to a particular process, operation, article or order. The measure used may be a percentage rate or a rate per unit, such as per article, per hour, per pound, etc.

The method of arriving at a rate will be determined by the basis upon which the establishment expenses are recovered in costs, and which may be one or a combination of the following—

1. Percentage on direct labour.
2. Percentage on prime cost.
3. Departmental rate.
4. Direct labour hour rate.
5. Machine rate.
6. As a rate per article dispatched and invoiced to customers.
7. As a percentage on the works cost of goods dispatched to customers.
8. As a percentage on the sales value of goods dispatched to customers.

Nos. 1 to 5 inclusive relate to the principal methods used for recovering factory expenses in costs, and Nos. 6 to 8 inclusive to the recovery of selling expenses.

EXPENSES. The expenses of a business are divided into two main groups, that is—

1. Expenses that have been specially incurred for specific orders and can, therefore, be charged direct to the specific job, operation or process.
2. Those expenses which have been incurred in the general running of a business, and which can only be dealt with as a general charge over the whole business.

The former are known as direct expenses and the latter as indirect expenses.

Direct expenses comprise such items as the cost of any assistance or facilities used for a special order or process, i.e. portable cranes or special machinery may be hired for a particular job, special travelling and other expenses incurred or heavy items of carriage on materials or parts, special draughting, etc., and all other items which are capable of being charged direct to the order.

Indirect expenses will comprise postages, stationery, telephones, rates and taxes, clerical assistance, depreciation, and all cash disbursements and book charges which cannot be directly chargeable to any one process or order. Indirect expenses, together with the indirect labour and indirect materials, constitute the establishment expense of a business. (See ESTABLISHMENT EXPENSE.)

EXPENSES—ALLOCATION OF. (See ALLOCATION OF EXPENSES.)

EXPENSES—CLASSIFICATION OF. The expenses incurred in any factory or works comprise one part of the three elements that together form the factory cost of a manufactured article. These expenses are generally found to be so numerous that correct classification in some definite form is absolutely necessary.

It is not uncommon to find in highly organized factories, in addition to the ordinary working expenses, that large sums of money are spent on the latest types of machinery and labour-saving methods, research and experimental work, welfare and recreation facilities for workpeople, etc., and the total sum involved for expenses may, therefore, easily be double or treble that of the total labour cost.

The classification of expenses will obviously differ with each factory, and no general form can be given that will be suitable under many conditions, but to explain the general principles underlying this subject the classification will be considered under the following main headings—

1. Labour (indirect).
2. Materials (indirect).
3. Administration expense.
4. Power expense.
5. Plant expense.
6. Building expense.
7. Miscellaneous expense.
8. Insurance.
9. Rent, rates, taxes.

10. Depreciation.
11. Fees, charges, etc.
12. Selling and distribution expense.

1. **Indirect Labour.** Refers to any work carried out in an indirect manner by way of manufacture, such as handling raw material into the various production shops, inspection and viewing, supervision, etc.

2. **Indirect Materials.** In addition to the main manufacturing materials known as direct materials, a variety of other materials are generally required in any factory to help complete the many processes carried out in manufacturing. These do not, however, form part of the actual finished products and are, therefore, classified as " indirect materials." Take, for example, cleaning materials, oil, grease, cotton waste, etc.

3. **Administration.** Administration expenses will be found to vary in accordance with class and size of any factory. In a reasonably large works the departments covered by this classification would be—

(1) General works office—including works manager and staff—Wages office, planning, progress.
(2) Cost and estimating.
(3) Drawing.
(4) Stores and goods inwards.
(5) Laboratory and research.
(6) Welfare and canteen.

Wages, salaries, and *all* expenditure in any, or all, of these departments would come under the heading of " administration expense."

4. **Power.** There may be several kinds of power, such as " electricity," " steam," " hydraulic," etc. Under this heading would be included all wages paid to mechanics and electricians, etc., employed in the generating station, boiler attendants and stokers in the boiler house, and the like, also all expenditure for coal, fuel, oil, water, repairs to plant or buildings, insurance, depreciation, etc., and items expended in the course of lighting and heating the factory, or any department connected with the works, etc.

5. **Plant.** Plant expense includes all items of expenditure on repairs and renewals throughout the works, administrative offices, etc.

6. **Building.** Building expense includes all items of expenditure on repairs to the various buildings throughout the works, including all administrative and commercial departments.

7. **Miscellaneous.** Miscellaneous expenses are those which cannot conveniently be classified under any of the main headings and are, therefore, referred to as "unclassified expenses." Such expenses may occur in any manufacturing shop or administrative department.

8. **Insurance.** Most factories, large or small, generally take precaution by covering the value of the works against the risk of fire. All moneys paid in respect of premiums would come under this heading.

9. **Rent, Rates and Taxes.** These items of expense occur in all factories. The method of apportionment to the various departments is considered elsewhere.

10. **Depreciation.** All plant and buildings throughout the works decrease or depreciate in value year by year, and, therefore, a certain sum has to be accounted for to cover the value of depreciation, thus forming an expense termed "depreciation."

11. **Fees, Charges, etc.** Under this heading would be directors' fees, legal charges, audit fees, and any other professional expenses that might be incurred.

12. **Selling and Distribution.** Will comprise all expenditure incurred in the sale and distribution of the finished article. Any item entering into the cost of manufacture would be excluded. The items falling under this heading would be: Salaries paid to sales manager and his staff, advertising, catalogues, literature, etc., commissions to agents, travelling expenses of Sales Department, discounts allowed, stationery, and also a proportion of such items as rent, rates, taxes, depreciation, heating, lighting, etc.

The nature of the various expenses may be said to be of two kinds, viz., "constant" and "variable," and a further analysis of the above classification under these two classes will give the following result—

Constant	*Variable*
(*a*) Insurance.	(*e*) Indirect labour.
(*b*) Rent, rates and taxes.	(*f*) Indirect materials.
(*c*) Depreciation—	(*g*) Administration
Plant.	(*h*) Power.
Buildings.	(*i*) Plant.
(*d*) Fees and charges.	(*j*) Building.
	(*k*) Miscellaneous.
	(*l*) Selling and distribution.

Form No. 45.

EXPENSES (Table Showing General Classification)

Service Order Ref.		Nature of Expense.	SERVICE.																	Production Departments.					Final Total.
			Administration.				Factory.									Selling.			Total.						
			1	2	3	4	1	2	3	4	5	6	7	8	9	1	2	3		1	2	3	4	5	
S.O. A	Variable Expenses	Labour (Indirect)																							
B		Materials (Indirect)																							
C		Administration																							
D		Power Electricity Steam																							
E		Plant (Repairs)																							
F		Building (Repairs)																							
G		Miscellaneous (Unclassified)																							
H	Constant Expenses	Rent, Rates, & Taxes																							
I		Depreciation Plant																							
J		Depreciation: Buildings																							
K		Insurance																							
L		Fees & Charges Directors, Legal, Audit, &c.																							
M		Selling and Distribution																							

" Constant expenses " are those which do not vary directly with the volume of output or trade. " Variable expenses " are represented in the sum expended on all indirect expenses incurred in the working of a factory, and these will be found to vary or fluctuate with the volume of output or amount of work done in any given period. The distinction is, therefore, quite obvious, and it is a general practice to deal with expenses under these two headings. The former are what might be termed predetermined expenses, having to be met whether the factory is working or not. The latter are those which are made or occur during the process of manufacture, and as such will vary according to the " services " rendered.

Form No. 45 shows at a glance the general classification of expenses and method of allocation to the various " service " and " production " departments—

The classification of expenses in the financial accounts presents little or no difficulty, for they are generally analysed at the time of posting invoices in the Expenses Journal. These totals are collected and carried into a General Ledger under such accounts as " Repairs and Renewals Plant," " Repairs and Renewals Buildings," " Factory Expenses Power," " Factory Expenses General," " Rent, Rates and Taxes," " Depreciation Plant," etc., the system being regulated by the general requirements obtaining in each particular business. Their collection from the financial accounts and recovery in the cost accounts demand careful and more elaborated analysis. In order to obtain the records under the various columns shown across the table above, it is evident that strict departmentalization of the factory is necessary and a system of routine in operation, whereby the details may be easily collected and worked out. Recovery of expenses in the various " service " departments will present certain difficulties, and the cost accountant will frequently be confronted with many problems. Much, however, depends on the simplicity, or otherwise, of the system in operation. These remarks also apply in connection with the recovery of service departments' expenses in the various manufacturing or production shops.

The classification of expenses and their collection are further dealt with under the heading of " Service Orders."

EXPENSES—COLLECTION OF. (See Collection of Expenses, also Cost Control Account, Expense Section.)

EXPENSES DIRECT. (See Direct Expenses.)

EXPENSES INDIRECT. (See Indirect Expenses.)

EXPENSES—SELLING AND DISTRIBUTION. (See Selling and Distribution Expenses.)

EXPENSE SUSPENSE ACCOUNTS. (See Cost Control Accounts.)

EXPENSE SUMMARIES. (See Collection, Allocation, also Computation of Expenses.)

EXPERIMENTAL AND DEVELOPMENT EXPENSES. The expense in connection with experimental and development work may be divided into two general headings—

1. Experimental work which has reference to the development or improvement of a company's standard or stock lines.

2. Experimental work which will arise in connection with a customer's special order.

1. The experimental work which relates to the improvement, etc., of standard lines may again be divided so that the expense incurred by existing stock lines is shown separately from that incurred by entirely new lines. All labour, materials, and parts used on such work, together with a proportion of the establishment expenses, should be charged to special service or standing works orders, so that the total amount spent in this direction is easily ascertained. Separate service orders may be allocated to the different kinds of products. The total expense is in some cases included among the factory expenses, but as the benefits derived from experimental work may accrue to the business as a whole, it is more correct to deal with the allocation of the item on this basis and spread the cost over the whole business. Such treatment, however, will depend upon the total expense involved.

The cost of development, if large, should be spread over a period of time.

2. The cost of experimental work which is carried out on behalf of a special customer's order should be charged or shown against the cost of the order in question or spread over a definite quantity of the goods if repeat orders will be forthcoming. (See also Service Orders.

FACTORED GOODS CONTROL ACCOUNTS. (See Cost Control Accounts, also Stores—Financial Control of.)

FACTORY COST. The sum of all items of expenditure *incurred* in the manufacture or production of any commodity, i.e. prime cost (direct materials, direct labour, and direct charges), plus factory expenses.

FACTORY EXPENSE ALLOCATION. (See Allocation of Expenses.)

FACTORY EXPENSE CONTROL ACCOUNTS. (See Cost Control Accounts.)

FACTORY EXPENSES. A subdivision of establishment expenses, comprising all the indirect expenses which are incurred in running the works, the cost of all direct labour employed, and the amount of indirect materials consumed in production.

Factory expenses include such items as the cost of repairing and keeping in good order all plant, machinery, and works premises, depreciation of plant, machinery and buildings, works travelling expenses, works stationery, salaries of works manager, works superintendents, and works clerical staff, petty cash items and other sundry works expenses, wages of foremen, charge hands, shop clerks, watchmen, caretakers, shop sweepers and cleaners, enginemen and boilermen, crane drivers, labourers, etc., also oil, waste, spoilt materials and other miscellaneous factory supplies ; light, heat and power, charges for water, gas, and electricity used by the factory ; proportion of rent, rates and taxes, cost of purchasing and handling materials, and a share of the expenses incurred in the general and financial administration of the business.

The work entailed in the treatment of factory expenses will require to be done in the following stages—

(*a*) **Collection,** which refers to the collection and transfer of expenses from the financial accounts to the cost accounts.

(*b*) **Allocation,** which is the work of analysing each item of expense under its respective group.

(*c*) **Computation and Recovery,** which refers to the method by which the expense rate is calculated and recovered in the individual cost accounts.

The general principles relating to the treatment of factory expenses are very similar to those described for establishment expenses, and as most of the important points are given under that heading, reference should be made thereto.

There are a number of methods of recovering factory expenses in costs. No one method can be regarded as suitable under all conditions or even applicable to any one particular class of industry, as the nature of the product or goods and the conditions under which they are made will not be the only deciding factors. The size of the factory and the volume of production, etc , must to an equal extent also enter into any consideration of this subject.

The various methods principally used for recovering factory expenses are given below, and a detailed consideration of each method will be found under its respective heading—

1. Percentage on direct labour.
2. Percentage on prime cost.
3. Departmental rate.
4. Direct labour hour rate.
5. Machine rate.

FICKER. METHOD OF REMUNERATING LABOUR. A Method of Sharing Savings in Time and Expense. By this method the daily wage is guaranteed and it can be calculated either on a time basis or piece basis.

On the time basis it is calculated from the following formula—

$$R_1 \quad H_1 + \tfrac{1}{2}(H_2 - H_1)(R_2 - R_1)$$

Where R_1 = hourly rate
R_2 = machine rate
H_1 = time taken
H_2 standard time.

On a piece basis the formula is—

$$N R + \frac{R_1}{2}(H - H_1)$$

Where N = number of pieces
R = rate per piece
R_1 = machine rate
H = standard time
H_1 = actual time taken.

Considerable clerical labour is required for this method, and the calculations are too complex to be easily understood by operatives. As in some of the other systems, the incentive will only be attained by the ambitious. Inasmuch as there is a sharing both of the saving in time and indirect expense (oncost) it should be above suspicion on the part of employees.

It is somewhat more generous than a piece rate. It starts at 100 per cent output, but there is neither step nor bonus below standard. The cost per piece produced is low where employees are above the average, but under converse conditions it becomes high. (See also Remuneration of Labour—Methods of.)

FINAL COST. (See Total Cost.)

FINAL COST SUMMARY. (See Cost Summaries.)

FINANCIAL CONTROL OF STOCKS. (See Cost Control Accounts, also Stores—Financial Control and Perpetual Inventories.)

FINISHED STORES CONTROL ACCOUNTS. See Cost Control Accounts, also Stores—Financial Control and Perpetual Inventories.

FIRE INSURANCE. The amount of premium paid in connection with insurance against fire is allocated direct to the Administrative, Selling, and Factory Expense Account.

Insurance of Buildings, etc. The premiums paid on fire insurance to cover buildings will be apportioned according to the space occupied by the respective departments.

Insurance on Plant and Machinery, etc. The premiums on fire policies covering plant and machinery are allocated on the basis of the total value of machinery in each of the factory departments, whereas the amount of premiums on power plant will require slightly different treatment if the company generates its own power. In such a case the amount of premium is charged to the Power Department, and is apportioned over the various kinds of power generated according to the value of the respective power plants.

With very large concerns the value of machine tools, plant, etc., may be analysed into various groups, in which case separate premiums may be shown for such items as patterns and dies, loose tools, etc. When these accounts are segregated in this manner, the amount of premium paid on patterns, dies, etc., may be charged to a separate account, which will also receive charges for depreciation, etc., and then allocated over the respective factory departments using the patterns ; alternatively the amount may be charged direct to the foundry.

The actual method of allocation will, therefore, depend upon the size of the factory and the extent to which the factory expenses are classified.

Insurance of Stocks, etc. The premiums payable upon fire insurance policies, which cover stocks of materials and saleable goods, are chargeable as follows—

Premiums on stocks of raw materials and parts held for manufacturing purposes will be charged to Factory Expense Account or Material Expense Account, whereas the premiums on saleable stocks will be charged to Selling Expense Account.

In some businesses, however, the amount of fire insurance is regarded as a financial charge and allocated direct to administrative expenses.

FIXED EXPENSES. (See Constant Expenses.)

FIXTURES AND FITTINGS. A term that is generally used when referring to benches, racks, bins, desks, etc. The fixtures and fittings of a business are usually analysed in the cost accounts under the headings of works fixtures and fittings and office fixtures and fittings, this analysis being necessary when a separate expense rate is used for recovering selling and factory expenses.

With large concerns the fixtures may be further analysed into permanent fixtures and loose fixtures. Permanent fixtures are, as their name implies, of a permanent character and usually form part of the main buildings, whereas loose fixtures will include all movable items, such as desks, tables, benches, when not forming part of main buildings or structure, etc.

The actual items that are covered by all of the above terms will vary in almost every case, as certain parts of the lighting system, for instance, will be classified as fixtures, e.g. lamp fittings, switches, wiring, arc lamps, rosettes, guards, extension cord and, in the case of transmission plant, will comprise pulleys, hangers, stringers, shafting, etc. Such items as these, however, are more correctly classified as permanent or loose lighting equipment, transmission equipment, etc.

FIXTURES AND FITTINGS—OFFICE. (See OFFICE FIXTURES AND FITTINGS.)

FIXTURES AND FITTINGS—OFFICE—DEPRECIATION OF. The amount of depreciation on office fixtures and fittings is a charge to the selling and administrative sections of the business, and the item may be either apportioned over these two departments arbitrarily or in cases where the values of fixtures, etc., are recorded separately, the amount is allocated direct. (See also DEPRECIATION.)

FIXTURES AND FITTINGS—OFFICE—REPAIRS AND MAINTENANCE OF. The method used for ascertaining the amount of the expense of repairs and maintenance of office fittings will depend upon the size of the concern and the amount of work done. With the small business the expense can conveniently be allocated to an Office Repairs and Maintenance Account, or included with the cost of repairs, etc., to buildings. This account is then closed out at the end of each month or other period, and the amount apportioned to the Selling and Administrative Expense Accounts.

With large concerns, however, the cost of repairs will usually be heavy, and a system of service orders must be used in order that the amount of expense incurred by each department can be ascertained.

FIXTURES AND FITTINGS—WORKS. (See WORKS FIXTURES AND FITTINGS.)

FIXTURES AND FITTINGS—WORKS—DEPRECIATION OF. Depreciation of works fixtures and fittings is included among the factory expenses, and the amount allocated to the respective departments according to the value contained in each. With those concerns where the departmental method of recovering factory expenses is not used, this further allocation will not be necessary. (See also DEPRECIATION.)

FIXTURES AND FITTINGS—WORKS—REPAIRS AND MAINTENANCE OF. The cost of maintaining in good repair the fixtures and fittings of the factory is a charge to the factory expense. The actual method used for collecting the various expense items will depend upon the size of the factory and the amount of repairs done in a given period. With the small concern such expenses can conveniently be allocated either to a Fixtures and Fittings Repairs and Maintenance Account or included with the cost of repairs, etc., to buildings. The account is then closed out at the end of each month by transferring the balance to the Factory Expense Account or Depreciation Account in those cases where the rates for depreciation include an allowance for repairs.

The cost of repairs, etc., to fixtures and fittings will usually be heavy with large concerns, and a system of service orders must then be used so that this expense can be controlled and allocated to the respective departments. (See also REPAIRS AND MAINTENANCE.)

FLAT COST. (See PRIME COST.)

FLUCTUATING EXPENSES. (See VARIABLE EXPENSES.)

FRANKLIN METHOD. METHOD OF REMUNERATING LABOUR. This is an example of one of the most advanced American methods, and is a meritorious attempt at taking into consideration a number of factors not usually taken into account when fixing rates of pay. It is somewhat complicated and requires considerable clerical labour in handling. There is a distinct incentive and not only is saving in time paid for, but also such fixed charges as it is possible for the operator to modify. The formula is as follows—

$$r = \left[\left(\frac{K[B(1 + i + m + ny) + R](1 + 2e)}{V(1 + 1{\cdot}3E - {\cdot}3e)(1 + {\cdot}35Pa) + S} \right) \left((Pt + Pd(1 + 5e) \right) \right] C$$

The definitions of terms follow—

r = Base hourly rate man is to receive
K = A constant when V is 100% to bring worker under standard conditions to standard rate
B = Fundamental base rate, temporarily that of 1905

i = Percentage of increase in living since 1905, taken on the 15th of January, April, July, and October of each year
m = Percentage allowed for each extra process known or learned
n = Percentage allowed for years of connected service
Y = Years of such service
R = Fixed charges, rate per hour which man has chance to modify
e = Percentage of premium earned on time allowance
V = 100, which is the standard accomplishment per cent
E = Standard premium task time set
Pa = Percentage of time absent or late
S = Value of spoiled work per producing hours worked
Pt = Percentage of time under task
Pd = Percentage of time spent on non-task or straight time work
C = Co-operation and conduct.

The base rate is revised and adjusted where necessary every three months, and a rather elaborate card is kept upon which are recorded all changes and also operatives' weekly earnings.

The labour and indirect cost (excluding materials) is calculated from the following—

$$X = (r(1 + e) + R)\,t$$

where X = labour and indirect cost
t = time taken to do the work

Other symbols as previous list. (See also Remuneration of Labour—Methods of.)

FULL NORMAL OUTPUT CAPACITY—BASING EXPENSES ON. (See Establishment Expenses.)

GANTT TASK AND BONUS. METHOD OF REMUNERATING LABOUR. By this method the daily rate is guaranteed. The basis of this method of payment in Mr. Gantt's own words is: "The employee is not told in a general way to do better, but has a definite standard set for him and is shown how to reach that standard for which he is awarded compensation in addition to his usual day's pay." He prefers to pay the bonus as extra time taken as a percentage of the time allowed, usually between 25 per cent and 50 per cent.

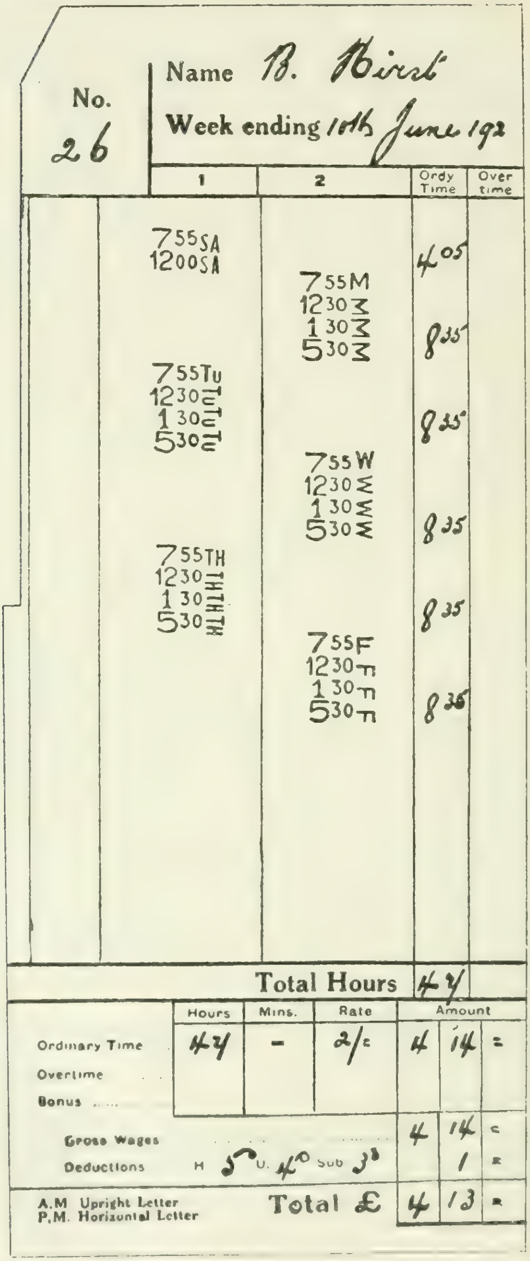
The basis of this, as in most of the modern systems, lies in the careful calculation of the standard.

The principal disadvantage is that only the most ambitious workmen try to earn the bonus, others falling back on the guaranteed daily rate. This can be offset by the use of the charts devised by Mr. Gantt.

It is, however, a tactful way of adopting what has been called the "step" incentive at the standard without any temporary loss in earnings.

The cost per piece produced is usually low, but higher than

Form No. 46.



No. 26

Name B. Hirst

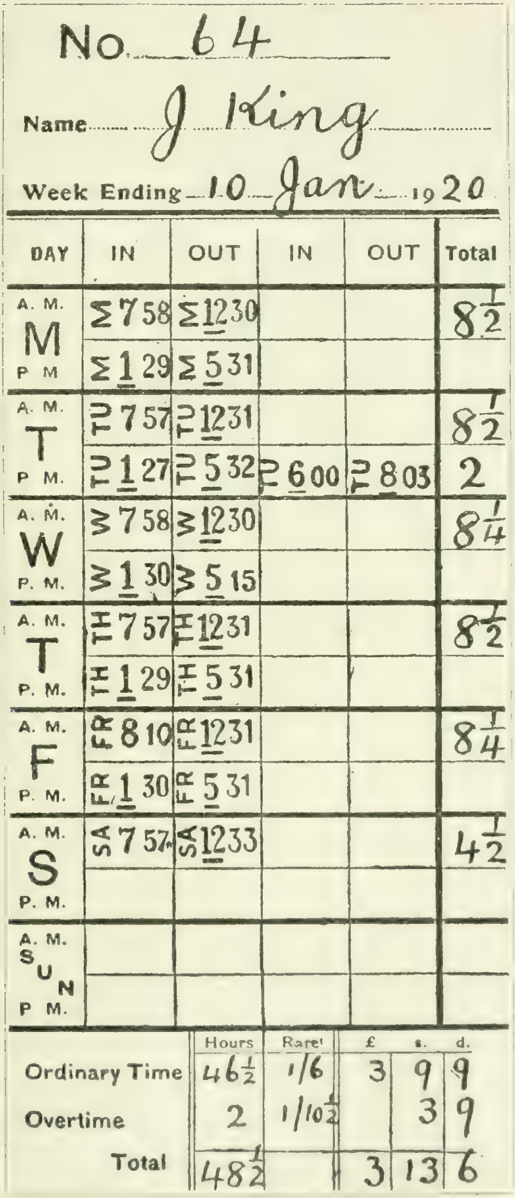
Week ending 10th June 192

		1	2	Ordy Time	Over time
		7 55 SA 12 00 SA		4 05	
			7 55 M 12 30 M 1 30 M 5 30 M	8 35	
		7 55 Tu 12 30 Tu 1 30 Tu 5 30 Tu		8 35	
			7 55 W 12 30 W 1 30 W 5 30 W	8 35	
		7 55 TH 12 30 TH 1 30 TH 5 30 TH		8 35	
			7 55 F 12 30 F 1 30 F 5 30 F	8 35	
			Total Hours	47	

	Hours	Mins.	Rate	Amount		
Ordinary Time	47	-	2/-	4	14	-
Overtime						
Bonus						
Gross Wages				4	14	-
Deductions	H 5^d	U. 4^d	Sub 3^d		1	-
			Total £	4	13	-

A.M Upright Letter
P.M. Horizontal Letter

Form No. 47.



No. 64

Name J King

Week Ending 10 Jan 1920

DAY		IN	OUT	IN	OUT	Total
M	A. M.	M 7 58	M 12 30			8½
	P M	M 1 29	M 5 31			
T	A. M.	TU 7 57	TU 12 31			8½
	P M.	TU 1 27	TU 5 32	TU 6 00	TU 8 03	2
W	A. M.	W 7 58	W 12 30			8¼
	P. M.	W 1 30	W 5 15			
T	A. M.	TH 7 57	TH 12 31			8½
	P. M.	TH 1 29	TH 5 31			
F	A. M.	FR 8 10	FR 12 31			8¼
	P. M.	FR 1 30	FR 5 31			
S	A. M.	SA 7 57	SA 12 33			4½
	P. M.					
SUN	A. M.					
	P M.					

	Hours	Rate	£	s.	d.
Ordinary Time	46½	1/6	3	9	9
Overtime	2	1/10½		3	9
Total	48½		3	13	6

some other forms, because of the guaranteed daily rate. (See also REMUNERATION OF LABOUR—METHODS OF.)

GATE CARDS. Cards used for the mechanical recording of the time of arrival and departure of workers. The rulings of gate cards chiefly differ according to the type of time recorder used. With some types of recorders the time is printed in column form which allows an unlimited number of time bookings, but with others which register in fixed positions the number of printings is generally limited to eight each day, that is four " in " and " out."

With both the above types two coloured ribbons can be obtained, and enable all irregular times to be printed in red and regular times shown in blue or black.

A specimen of both forms of gate card is given on pages 150 and 151.

GATE CARDS—USE OF. The record of time spent in the factory which forms the primary basis of calculating the workers' pay each week is made quite separately from the times spent on each task or order, and a mechanically printed record is necessary if absolute accuracy is desired. Time recorders will prevent disputes and establish confidence, as an employee can see his registration when made. The cards used by the men at the gates and known as gate cards are essentially a record of attendance, as all time wages are calculated therefrom. Each employee is provided with a gate card for each week, and the actual routine in connection therewith will vary with the number of workers and size of the factory; for instance, with the smaller concern the time recorders and card racks will usually be placed in some convenient position in the factory, as the same time recorder may be used for booking time to jobs in addition to recording the attendance at the factory. In such cases there is usually provided four card racks, two of which will contain the gate cards and the remaining two the job cards. The two racks for the gate cards are placed one each side of the clock, and are known as the " in " and " out " racks.

On entering the factory in the morning each worker takes his gate card from the first rack, inserts it in the time recorder, and registers his time by pressing a lever. On completing this operation the gate card is placed in the second rack. The former is the " out " rack and the latter the " in " rack.

On leaving the premises either at midday or evening, the worker takes his card out of the " in " rack, registers his time, and places it in the "out" rack so that it will be available when entering the factory the next morning.

At the end of the pay week the gate cards are collected and replaced with fresh cards for the ensuing week, which have been previously made out by the Wages Department. The number of hours each worker has attended the factory on each day is now ascertained and entered by the wages clerk in the columns provided. The summary at the foot of the card is next completed, and any deductions for National Health and Unemployment Insurances or subscriptions to sports club, etc., made and the net amount ascertained.

Upon completion of this work the cards, which should be retained in order of check or clock number, are next entered in the pay roll in order to ascertain the total amount of wages payable for the week in question.

The above method will be found quite suitable for the smaller sized factory, but with very large concerns it will invariably be necessary that separate time recorders be used for registering the attendance at the factory. In such cases the clocks will be placed at or near the gates and in charge of the gatekeeper or chief time clerk, as it is usual that a method for supervising the men during the process of clocking "in" and "out" be instituted. There are two general methods of doing this; the first is to have locks affixed to each clock, and the gatekeeper to open the recorders for use at stated times and then to lock them up a few minutes after starting times.

Alternatively, locks may be fitted to the card racks which are locked between starting and finishing times to prevent their unauthorized use. In either case, however, the gatekeeper or time clerk must be present whilst the clocks are being used.

The procedure in regard to the "in" and "out" clockings will be similar to that described above for small factories, excepting that "in" and "out" card racks will contain only gate cards and will be arranged in a manner that will expedite the "clocking" process, as a greater number of men must now be dealt with in a short period of time.

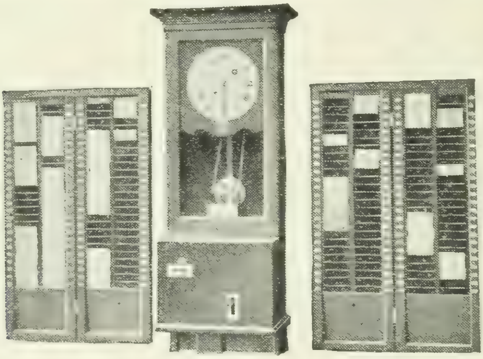
GENERAL EXPENSES. (See Establishment Expenses.)

GENERAL MANAGER—SALARY OF. The salary paid to a general manager forms part of the establishment expenses of a business and the amount is allocated to the administrative expense. In some instances, however, a general manager may devote more time to one or more sections of a business, and in such cases the salary should be apportioned over the Factory, Selling, and Administrative Departments according to the amount of time it is estimated he gives to each section.

GENERAL SERVICES. (See SERVICE DEPARTMENTS.)

GENERAL WORKS RATE. A term sometimes used when one general expense rate is applied to recover the whole of the factory expenses in place of a separate rate for each department. Such a term is ambiguous, as it does not indicate any particular method of recovering expenses and should. therefore always be qualified in some special direction. (See COMPUTATION AND RECOVERY OF EXPENSES.)

GLEDHILL-BROOK EMPIRE CLIPPER TIME RECORDER. This machine was designed specially to meet the needs of a factory where a time recorder was required to register time spent on jobs as well as to record employees' " in " and " out " times. With an ordinary time recorder, the number of stampings given in any period of twelve hours is limited to four, and these are printed across the card. When these four stampings have been registered on a card, the card cannot be used again during that twelve-hour period. Consequently this type of machine was restricted to certain kinds of costing systems.



A new design of machine which would print in a vertical column and give unlimited registrations, no matter how short the interval between the first and last registration, therefore became necessary. The " Empire " clipper at each registration clips a small piece out of the side of the card equal in depth to the depth of the type used for registering the day, hour and minute. By this means, the card drops a little farther each time it is placed in the card sheath, thus automatically setting the card for the next registration, no matter what interval of time has elapsed since the last stamping. It is possible, therefore, to get all records of time spent on jobs as well as factory time for one week on one and the same card. The machine is also particularly useful in factories when overlapping shifts are worked, as no attention is required from the timekeeper in setting the clock.

GOODS RECEIVED BOOK. (See Goods Received—Records of.)

GOODS RECEIVED—INSPECTION OF. With certain industries provision must be made for the inspection and test of certain goods or materials received from outside suppliers, in order to ascertain whether they comply with any specification previously notified to the buyer on the purchase requisition.

Inspection of materials should be carried out immediately upon receipt and before they are handed over to the storekeeper. With large concerns it may be desirable to attach to the Receiving Department a permanent staff of inspectors, and when such conditions prevail the system required will not present any great difficulty as the inspection and test can be carried out at the same time as the receiving clerk is unpacking. On the other hand, it may be more convenient for the inspection of those materials which must comply with any special conditions to be undertaken by the Works Inspection Department, or view room, leaving the storekeeper to inspect the remaining general stores items.

The occasion will sometimes arise when part of a consignment of goods must be rejected, and in such a case a rejection note, ruled similar to the illustration given on page 158, should be made out, stating the reason for rejection.

The distribution of rejection notes will depend upon the system in operation, also the number of departments concerned, and in view of this no definite routine can be given that will be suitable under all conditions. The general principle of the receipt and inspection of goods is, however, dealt with more fully under the heading of "Purchasing." (See also Goods Received—Rejection of.)

GOODS RECEIVED—RECORD OF. Upon the receipt of any goods by a concern, it is essential that an accurate list be prepared, otherwise there can be no check against the supplier's invoice or the stores records.

It is the common practice with some firms to record particulars of all goods received in a book and which may be known as a " Goods Received Book," or, in cases where carbon copies are made for distribution to the departments concerned, a " Goods Received Sheet." A specimen ruling of such a record is given, with the description of the routine in regard to " purchasing." See page 275.

The objects and purposes of a goods received record may be briefly stated as follows—

(*a*) To provide a complete record of all goods and materials received.

(*b*) To notify the storekeeper of the quantity of goods which will be charged to the Stores Account, and which must be ultimately accounted for.

(*c*) To provide a basis for checking the supplier's invoices.

(*d*) To notify all departments concerned of the receipt of goods in those cases where this is necessary.

With some concerns a Goods Received Book in duplicate will serve most requirements, as the one copy may be torn out of the book at the end of each day and passed to the buyer for checking invoices, and then be sent to the Cost Department for making the necessary entries on the stock record cards. This method has its advantages for those concerns who only receive a few consignments daily, but when a considerable number of deliveries are made each day, the delay that usually occurs in notifying the storekeeper or buyer of the receipt of goods or in the writing up of the stock records, detracts considerably from the advantages that the system may possess. The method generally used by large concerns, therefore, provides for the recording of each consignment of goods on a separate slip or note. This system has many advantages, and the small amount of extra stationery involved is negligible when compared with its efficiency.

The specimen forms which are illustrated on pages 276 and 277 are an example, and may be known as a " goods received note " or " inwards goods note." A detailed description of the use of such forms has been given under the general consideration of " Purchasing," to which reference should be made.

GOODS RECEIVED—REJECTION OF. With most industries certain of the materials and goods received from outside suppliers will require to be inspected or tested, in order to ascertain whether they comply with any specification previously notified to the buyer on the purchase requisition. When the whole or a part of a consignment must be rejected, a note of the defective goods may be made on the goods received record, when a separate slip is used for each consignment; alternatively, a rejection note must be made out. The rejection notes used in connection with inwards goods or " bought-out supplies " will follow a different routine to those issued for the rejection of goods made in the factory. With " bought-out supplies " the rejection will primarily concern the office departments, but if a Planning or Progress Department forms part of the factory organization, this must also be taken into consideration.

No definite routine can be given that will be suitable under all circumstances, and the undermentioned methods and specimen forms are furnished by way of illustration only. The specimen form of rejection note (Form No. 48), quotes at the top the words " Stores Inspection," as all goods received are examined by a member of the works inspection staff in the receiving section of the stores. The rejection note is made out in triplicate and the copies distributed as follows—

1. The first copy is attached to the third copy of the inwards goods note (or goods received record) (see PURCHASING, page 268), when both forms are then sent by the storekeeper to the buyer.
2. The second copy is sent to the Planning Department.
3. Third copy remains in the book.

1. Upon receipt of the rejection note by the buyer (also third copy of the inwards goods note, which is the storekeeper's receipt for the balance), he is able to take suitable steps for the replacement of the defective goods, and obtain credit for the quantity in dispute before passing the supplier's invoice. It will be noted that at the bottom left-hand corner of the form space is provided for noting the date, etc., when the defective goods are returned either for credit or replacement.

2. The second copy, which is sent to the Planning Department, serves as a notification to that department that the goods have been rejected, and enables them to modify any planning of work on the materials in question, should this be necessary.

3. The third copy remains in the book and is retained by the inspectors as a permanent record.

The above brief description is sufficient to indicate the purpose that is served by the rejection note up to the point of advising the buyer, but the extent to which a rejection of " bought-out supplies " will affect the routine of the Costing Department will depend upon the manner in which the record of goods received is made out; for instance, it may be the

Form No. 48.

STORES INSPECTION
B.O. Supplies

....19........

Supplier..

....

Order Ref.........................   Sent to.................................

DESCRIPTION.	QUANTITY.

REJECTED FOR—	VIEWED BY

RETURNED.

Date.	Advice No.	Sig.

practice for the storekeeper to state on his copy of the goods received record the actual quantity he has accepted and placed into stock and, providing there is some means of reconciling this quantity with that stated on the supplier's invoice, the stock record cards and stores control accounts should "agree." Such a method, however, will generally entail a considerable amount of clerical work, and the matter can be more easily dealt with by making use of the rejection note when posting the "receipt" on to the stock record card. With the method explained above the buyer's copy of the rejection note, which is received by him attached to the inwards goods note, is sent to the Cost Department, who enter on their stock record card the actual quantity received and signed for by the storekeeper.

For details relating to the rejection of goods made in the factory, see MANUFACTURED GOODS—REJECTION OF; WORK TICKET; also INSPECTION CERTIFICATE.

GOODS RECEIVED SHEET. (See GOODS RECEIVED—RECORD OF.)

GOODWILL. The amount of goodwill written off in the financial accounts at the end of a trading period appears to present difficulties to many minds so far as the cost accounts are concerned. The "writing off" of goodwill is a profit and loss transaction, and the amount must not be included in the cost accounts.

GROSS COST. (See TOTAL COST.)

GROUP CENTRES FOR EXPENSE ALLOCATION. A term often used when referring to the allocation of factory expenses to individual machines or groups of machines, rather than departments, when the machine rate method of recovering expenses is operated.

HALSEY PREMIUM—METHOD OF REMUNERATING LABOUR; ALSO KNOWN AS PREMIUM BONUS. The most important item for notice under this method is that the operator is guaranteed his daily rate of pay under any circumstances. In this it agrees with some other systems, but it is a fundamental departure from the older practices and along the right lines.

A standard time is set for the performance of the work to be done, and the operator is paid for a fixed percentage of the saving in time accomplished by him, usually $33\frac{1}{3}$ per cent or 50 per cent.

The fixing of the standard time is of the utmost importance, but the method of doing so varies within wide limits. Often the average time taken to do the work by day work is taken; not infrequently the shortest time taken is used. More rarely a standard time in excess of the average is used; this is done deliberately to encourage the operators. When this method is used for machine work, the setting up time of the machine must be included, e.g.—

	Hrs.	Min.
Setting up time	–	45
Operating allowance—10 pieces × 35 minutes .	5	50
TOTAL	6	35

This method is advantageous where the rate-setting is of the usual order, as there is not much risk for the employer. Where it has been in operation it has been fairly successful, but there has been criticism that while satisfactory for work on which it has been established, there is evidence that operators have manipulated day rate times in order to obtain a high standard time when the occasion arises to place the new work on a premium basis.

The most damaging criticism is that the standard times are indefinite and lax. For a fuller discussion of setting standards see RATE-SETTING.

The gains from the operator's point of view are the guarantee of day rate when unable to achieve the standard time, and the opportunity of extra earnings when saving in time is effected.

There is no doubt that this method leads to better relations between employer and worker and, while not ideal, it is a long step in the right direction. The effect on the reduction of cost per piece produced is not very dependable, and in practice the cost is much higher than might be expected. (See also REMUNERATION OF LABOUR—METHODS OF.)

HEAD OFFICE ONCOST. (See ESTABLISHMENT EXPENSES.)

HEATING PLANT—DEPRECIATION OF. (See DEPRECIATION, also PLANT—DEPRECIATION OF.)

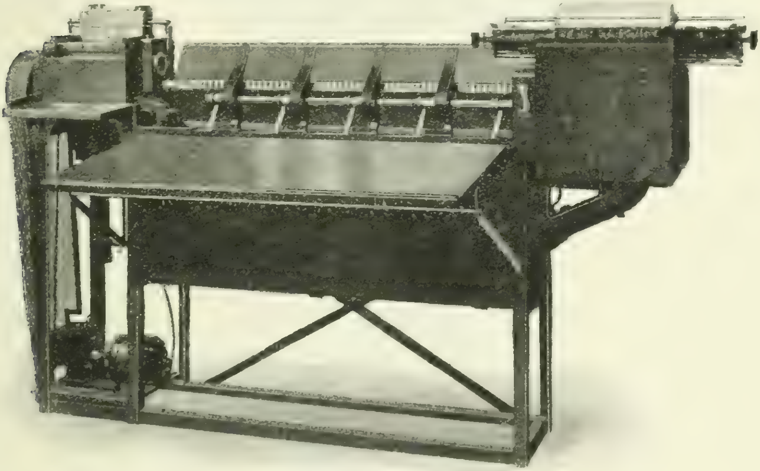
HEATING PLANT—REPAIRS AND MAINTENANCE. The cost of repairing and maintaining of the heating plant in good order is a charge to the Heating Expense Account, which is ultimately apportioned over the Office and Factory Departments' Expense Accounts on the basis of cubic area.

In those cases where the heating plant is very small, the expense of repairs, etc., can more conveniently be charged to a general Repairs and Maintenance Account for buildings, nd the cost distributed together with other building expense.

When the heating plant and the area to be heated are very large, the cost of repairs will be collected by means of a system of service orders, to which will be charged all labour materials and other charges. By this method it is possible to ascertain the cost for each department, but in general the expense of maintaining the apparatus in good order is best dealt with by collecting all repair charges into one account, and distributing it together with the cost of repairs to buildings.

The choice of any one method, however, will entirely depend upon the size of the heating apparatus, also buildings. (See also REPAIRS AND MAINTENANCE.)

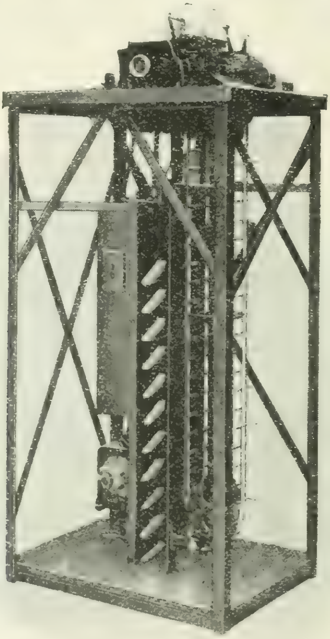
HOLLERITH ELECTRICAL TABULATING AND SORTING MACHINES. The Hollerith machines were invented to do the work of the United States census of 1890, using perforated cards. So successful were they on that work that they were adapted to commercial uses. Commencing with hand-operated machines they passed through various stages, until to-day we have an electrical tabulating machine, which, running at a speed of 15,000 cards per hour, will give group totals on visible counters and, in addition, a printed record of the figures produced. Sub and gross totals are provided for.



TABULATING MACHINE

Speed, to-day, is an essential factor in practically every business operation, and is an especial necessity when securing important data. The Hollerith machines, because of their automatic character, possess this necessary requirement, and supply results with phenomenal speed and mechanical accuracy.

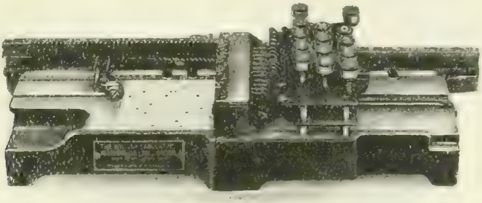
The tabulating machine is electrically operated, the results being produced by means of an electrical contact made through the holes punched on the cards which are used. The latest type, which possesses the feature of the automatic control, is able to detect a change in the group numbers punched on the cards, automatically stops, prints the results, resets to zero, and restarts. This eliminates the necessity of using " stop " cards.



Sorting Machine

The sorting machine, also operated by means of an electrical contact made through the holes in the card, will sort cards into any desired order at a running speed of 15,000 cards per hour.

Portable hand-operated key punches are used for the perforation of the cards which require only junior labour. The punched holes are mechanically checked by means of a similar machine, termed the verifying punch. The average speed of operation is 300 cards per hour.



Card Key Punch

The card generally used measures 7⅜ in. by 3¼ in. and is drawn up to suit the individual user. A typical form is illustrated on page 164.

The above card is designed for use as a labour cost card which is issued to the worker, who, by means of an automatic time recorder, shows on the reverse side the time started and time finished, and is used also for the " viewing or inspection certificate." The necessary calculations having been made and entered on the face of the card, it is then inserted in the Hollerith key punch and the requisite holes punched.

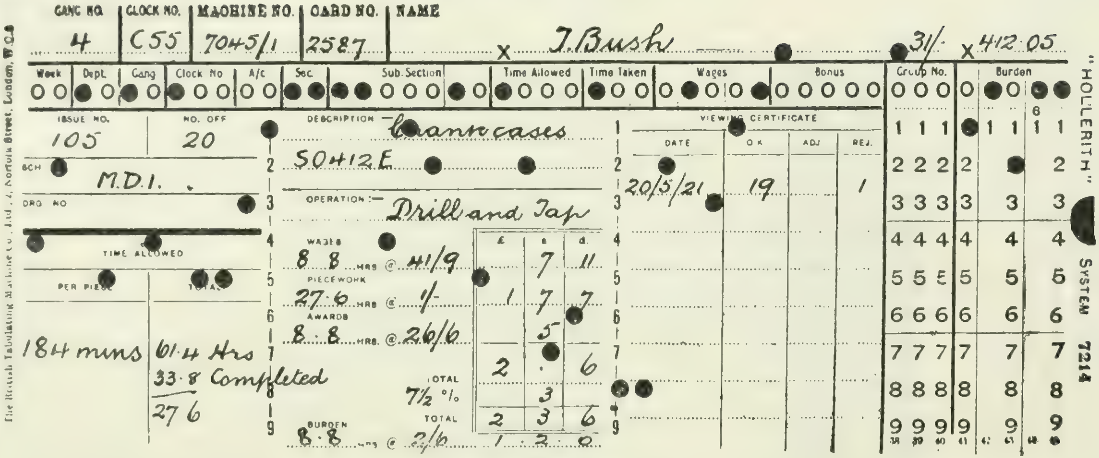
The cut holes are then verified in the verifying machine, after which the cards can be passed through the tabulator in order to obtain the gross totals of wages, which are then compared with the figures on the pay roll. They can afterwards be sorted into departments, cost account numbers, etc., and the desired analyses produced on the electrical tabulator.

The machines may be used in most industries for such purposes as—

Job costs.
Material purchases and issues.
Sales.
Plant inventories.
Insurance premiums and claims.
Transport records.
Etc., etc.

Form No. 49.

HOLLERITH JOB CARD



The British Tabulating Machine Co., Ltd., 2, Norfolk Street, London, W.C.2

"HOLLERITH" SYSTEM 7214

Gang No.	Clock No.	Machine No.	Card No.	Name
4	C55	7045/1	2587	× T. Bush 31/- × 412·05

Week | Dept. | Gang | Clock No | A/c | Sec. | Sub-Section | Time Allowed | Time Taken | Wages | Bonus | Group No. | Burden

Issue No. 105

No. Off 20

Sch M.D.I.

Drg No

Time Allowed

Per Piece

Total

184 mins

61·4 Hrs
33·8 Completed
27 6

Description — Crankcases
5O412E

Operation :— Drill and Tap

		£	s.	d.
Wages 8 8 hrs @ 41/9			7	11
Piecework 27·6 hrs @ 1/-		1	7	7
Awards 8·8 hrs @ 26/6			5	
		2	·	6
Total 7½ %			3	
Total		2	3	6
Burden 8·8 hrs @ 2/6		1	2	0

Viewing Certificate

Date	O K	Adj	Rej.
20/5/21	19		1

Labour Cost Card

Illustration of labour cost card, which is issued to the worker, who records his starting and finishing times on the back by the aid of a time recorder. The card is also used by the viewers. After the calculations have been made, they are entered on the face of the card and the requisite holes then punched as illustrated.

HOURLY BURDEN. (See DIRECT LABOUR HOUR METHOD OF RECOVERING EXPENSES, or MACHINE RATE METHOD OF RECOVERING FACTORY EXPENSES.)

IDLE TIME. (See UNALLOCATED TIME.)

INCIDENTAL EXPENSES. (See ESTABLISHMENT EXPENSES.)

INCLUSIVE COST. (See TOTAL COST.)

INCOME TAX. The amount of tax paid by a business is an allocation of profits and is not, therefore, included in the cost accounts.

INCOMING GOODS—RECORD OF. (See GOODS RECEIVED —RECORDS OF.)

INDIRECT CHARGES. (See INDIRECT EXPENSES.)

INDIRECT COSTS. (See INDIRECT EXPENSES.)

INDIRECT EXPENSES. Expenses other than indirect labour and indirect materials, but including cash disbursements and book charges which cannot be directly chargeable to any one process or product, but only apportioned according to some chosen method.

The term indirect expenses is sometimes used to denote all the indirect expenses of a business, i.e. establishment expenses. (See ESTABLISHMENT EXPENSES.)

INDIRECT LABOUR. Labour which cannot be directly measured or charged to a specific article, order or process, but which can only be apportioned according to some logical method.

The labour used by a manufacturing concern may be utilized in two ways: it may be employed in performing work directly upon a saleable article or product, or usefully employed in such work as sweeping the shop floor, attending to the issue of materials from stores, repairing the plant and machinery, or in supervising the workers of a department.

In the case of the former such labour is classified as "direct labour," and the latter as "indirect labour." With indirect labour it is not possible to charge it to any specific article or order on the basis of the actual work done towards its completion, although without such labour as this it is probable that the direct labour would not have been applied with equal efficiency.

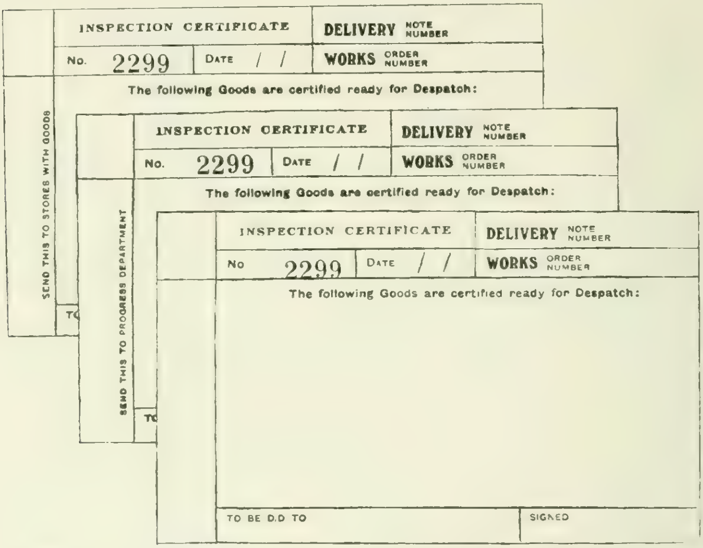
INDIRECT MATERIALS. Such materials as cannot be easily measured and charged direct to an article, order or process, but only apportioned according to some logical method.

Indirect materials may, therefore, include sundry items used for the maintenance of the plant, machinery and buildings, such as belting, oil, grease, cotton waste, etc., also solder, fluxite, emery paper, small perishable tools, chalk for polishing, and other items used in manufacturing.

INDIRECT WAGES. (See Indirect Labour.)

INSPECTION CERTIFICATE. A note issued by the Inspection Department, or view room, certifying that the goods stated thereon have passed final inspection.

Form No. 50.



SEND THIS TO STORES WITH GOODS

INSPECTION CERTIFICATE

DELIVERY NOTE NUMBER

No. 2299 DATE / /

WORKS ORDER NUMBER

The following Goods are certified ready for Despatch:

TO

SEND THIS TO PROGRESS DEPARTMENT

INSPECTION CERTIFICATE

DELIVERY NOTE NUMBER

No. 2299 DATE / /

WORKS ORDER NUMBER

The following Goods are certified ready for Despatch:

TO

INSPECTION CERTIFICATE

DELIVERY NOTE NUMBER

No 2299 DATE / /

WORKS ORDER NUMBER

The following Goods are certified ready for Despatch:

TO BE D.D TO

SIGNED

The use of such a form and the number of copies which will be issued will naturally differ with each concern, as the function of inspection will vary with the nature of the product and whether it is made in large or small quantities.

From a purely costing point of view the inspection certificate serves as a notification that certain work on the production order is finished, consequently no further time or materials should be booked against that order. With regard to the stores records, the certificate may also serve the purpose of an authority for the storekeeper to accept the goods into his stock. In such a case the inspection certificate may form the medium for entering the stock record cards relating to the finished stores, and also as a guide to the Cost Department when crediting Work in Progress Account and debiting Finished Stores Control Account with the value of the item.

In the case of special goods which are not placed into stock, the certificate may be the notification to the Sales Department that the goods named thereon are ready for dispatch.

A specimen set of inspection certificates is shown, which relate to a method of inspection for all goods which are placed in the finished stores, forms printed on a distinctive coloured paper being used for special items, and the top copy sent to the Sales Department. (See also MANUFACTURED GOODS—REJECTION OF; GOODS RECEIVED—REJECTION OF; and WORK TICKET.)

INSPECTION OF STORES. (See GOODS RECEIVED—INSPECTION OF.)

INSURANCE. (See BURGLARY INSURANCE, EMPLOYERS' LIABILITY INSURANCE, FIRE INSURANCE, NATIONAL HEALTH INSURANCE, and UNEMPLOYMENT INSURANCE.)

INTEREST ON CAPITAL. A great deal of misapprehension exists in regard to the question of interest on capital. The inclusion of such an item in costs is generally supported on the grounds that a charge should be made against production for the use of capital.

From a *cost-finding* point of view, interest on capital as distinct from interest on loans, such as debentures, mortgages, or bank overdrafts, etc., is not an item of cost, since a "cost" should only comprise expenditure actually *incurred*. On the other hand, interest on capital may sometimes be taken into consideration when dealing with *cost estimating* for the purpose of comparing the cost of one operation or method of manufacture with another if a change in such method is contemplated.

With regard to methods of cost finding and the question of interest on capital, the definition of the term "total cost," also the principles of "cost finding," definitely exclude all anticipated expenses, and items of this nature should not therefore be included.

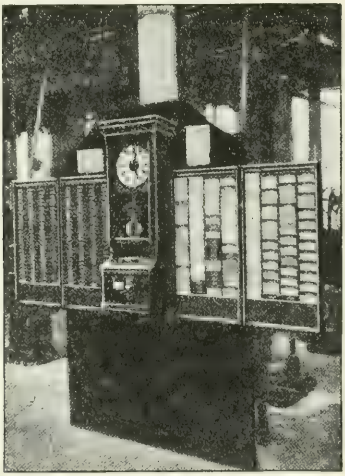
With regard to interest on debentures, loans, etc., the treatment of these items will vary according to the circumstances under which the liability is incurred, and reference should be made to the respective kinds of interest, i.e. "Debentures—Interest on," "Mortgages—Interest on," etc.

INTEREST ON DEBENTURES. (See DEBENTURES—INTEREST ON.)

INTEREST ON MORTGAGES. (See Mortgages—Interest on.)

INTERNATIONAL TIME RECORDERS. These machines give a weekly, fortnightly or monthly tabulated card record of every employee, printing the day, hour, and exact minute.

The employee takes his card from the " out " rack, places it in the clock, registers, and then puts it in the " in " rack. The card itself goes to the proper position in the recorder.



International Card Time Recorder
(Complete with Card Rack).

No transcribing of the time is necessary, and the machines give an actually visible record. The speed of registration is from 50 to 60 a minute.

These recorders can be obtained printing in two colours, showing all irregular times in red. As the sole object in time-keeping is to detect all irregular from regular time, the automatic two-colour ink ribbon is a valuable feature.

These card type of machines can be used for recording time of commencing and finishing each job on a separate card, thus giving an accurate basis for job costing.

The International job timing machine is interesting in this connection, as it will register a job " on " and " off " as many times as may be required, the card being unlimited as to size, shape, and form. The records appear on the edge of the card, each " off " record being above the " on " record, thus making it easy to calculate elapsed time. The International money time recorder not only gives the time " on " and " off," but calculates the elapsed time, and gives the money value of that time automatically.

INVENTORY—PERPETUAL. (See STOCK RECORD CARD.)

INWARDS GOODS NOTE. (See GOODS RECEIVED—RECORD OF, and PURCHASING.)

ISSUING AND RECORDING. A term sometimes used when referring to this particular phase of storekeeping, and comprises the issue of materials or goods against a stores requisition, and the recording of the issue upon a bin card.

The issue and recording of goods may be said to follow that of storing and recording. (See STORES ROUTINE.)

JOB CARD. A clock card used by direct workers for the mechanical recording of the starting and finishing time on each job, process or operation, and by indirect workers for recording the time they spend on each service order or class of indirect work.

The rulings of job cards for direct workers differ according to the type of time recorder used, the method by which each worker is remunerated, and the method of cost finding ; for instance, with the piece work method there is required spaces for the quantity of work done, whereas with the day rate method only the " times " would be necessary. For illustrations of job cards, etc., see BOOKING TIME TO JOBS—METHODS OF.

JOB COSTING METHOD OF COST FINDING. The basis of the job costing method is the costing of an individual job or piece of work. The job may be an order for a large quantity of articles or for one only or for a particular operation. In the engineering trades, for instance, the job may cover the manufacture of 1,000 camshafts or one flywheel cast to a special pattern ; likewise in a carpentry and joinery business, the order may be for 500 teak boxes or a single packing case. Whatever the article or quantity may be, the direct materials, direct labour, and its correct proportion of establishment expenses are charged to the particular order number, and the sum total constitutes the cost of the job, order or operation.

With most industries the work performed can be classified into two general groups, i.e. (1) work which directly relates to the manufacture of goods for sale, and (2) that class of work known as service or indirect.

The work performed in regard to group (1) will usually be authorized by a works order, production order or stock order, whereas with (2) the orders are known as service orders or standing works orders.

With the smaller sized concern the costing of a job will not present the same difficulties as with the larger concern, as the production orders will usually cover a less quantity of articles, whereas with the large concern, and especially those that manufacture on the mass production principle, the method generally becomes slightly more involved on account of the large quantities of articles or parts which have to be made. With the small concern one production order may be sufficient to cover the completion of a customer's order, whereas with the large concern the job will usually resolve itself into an order for the parts or particular operations that have to be performed in each department of the factory, instead of for the complete articles. For instance, assuming an order is received for 2,500–250 c.c. single cylinder petrol engines, the "job" will still be the 2,500 engines, but to assist production control and the collection of the many items which go to make up the cost of the completed order, the articles to be made are divided into components or parts, and separate sub-orders issued.

In the case referred to, the main production order would be, say, No. 3,750. The names of each part of the complete engine are then listed, and the necessary quantity of each to make up the 2,500 engines is ascertained and sub-orders may not only be issued for each part, but also for the various operations on each part.

In addition to the sub-orders for the manufacture of the various parts, there will be issued orders for assembling the individual parts into units, and further orders for assembling the units into a complete machine.

The assembly orders may therefore be of two kinds; firstly, there is the sub-assembly, i.e. the assembling of several parts into a complete unit, and secondly, the final assembly of these units into a complete engine. In the case of petrol engines there will be required further sub-orders to cover the testing of each engine.

Each class of sub-order would, therefore, be coded or given symbols to denote that they relate to the main order 3,750.

By splitting up the main order into the various parts of an article or its appropriate divisions for manufacturing purposes, and issuing a sub-order to cover each part or operation, it is possible to ascertain the factory cost of each part by charging all the materials and labour consumed to the respective sub-accounts.

Furthermore, by summarizing the total cost of each sub-order, it will not only enable the final cost of making 2,500 engines to be ascertained, but the cost summary can be arranged in such a manner as will clearly show the extent to which the various elements have entered into the final product.

A system of job costing when applied to certain industries may often be referred to by different names; for instance, the term *class cost method* is often used to denote the job costing method when applied to the costing of goods by classes, rather than by the individual unit, and instead of the "cost" being separately compiled for one piece of machinery or article, the cost will simply cover a group of orders of the same type of product. Whilst the job covers the "class" rather than the "piece," we still have the job costing method, but with a different unit or basis to that described in the preceding paragraphs.

To give one more instance, when a works order or production order covers an operation instead of a complete article or piece of machinery, the method is often referred to as the *operation cost method.* In most engineering works this type of costing is used as well as the ordinary job costing method, as it is sometimes found more convenient to cost certain articles or parts by "operation," due to the fact that a number of these articles or parts must be stocked in a part finished state for convenience in making up special orders.

With some industries many operations on a product are entirely the same up to a certain point, when the goods are then placed into stock in their semi-finished state. The articles are then drawn from stock when the final operation is performed to meet the special requirements of different customers. In such cases the operation cost method is necessary, as the finished state of the product cannot be ascertained until after the receipt of the customer's order.

It will now be observed that if a job costing method is to be installed, the unit for costing purposes, i.e. whether one will cost the complete article, the separate operations of each article, by classes of products, or even by a combination of all these units, will indicate the type of job costing system.

A brief consideration of job costing methods may be divided into four sections—

1. Accounting for materials.
2. Accounting for labour.
3. Establishment expenses.
4. Cost summaries.

1. Accounting for Materials. The routine that will be used in connection with materials will, firstly, depend upon the nature of the product and its method of manufacture, type of organization in the works, and the method of stores control. In many concerns the foreman of each department will requisition on the stores for any materials required, but whilst this method may work satisfactorily in smaller concerns, it is a practice that should not be recommended with the larger firms. To be effective it entails a considerable amount of checking by the Cost Department and the storekeeper; alternatively, a very elaborate system must be introduced in order to avoid over-issues. With such elaboration, however, it will rarely be possible to prevent the over-issue or unauthorized withdrawal of materials, as this will not become apparent until *after* the material has been obtained. To avoid difficulties in this direction, therefore, the planning or other department of the factory should be the only department authorized to issue and sign stores requisitions for direct materials or parts required on a works order. In the case of sundry supplies for service orders, such as lubricating and cutting oils, solder, emery paper, small tools, etc., stores requisitions can quite conveniently be made out by the foreman and for this purpose a distinctive coloured stores requisition should be provided.

With the smaller concern the Planning Department may not form part of the organization, and in such cases the stores requisition may conveniently be made out by the head foreman or his assistant.

2. Accounting for Labour. The method used for booking time to jobs will depend upon the nature of work performed, the system of wage payment in use, and the nature and amount of information required. There are numerous methods of booking time to jobs, each of which has its special application, but for convenience they may be grouped according to the principles underlying each method as follows—

METHOD No. 1. Combined job and gate card—each worker provided with only one card for the pay week, and on which is recorded the times he enters and leaves the factory, also the time "on" and "off" each job.

METHOD NO. 2. Combined job and gate card—each worker provided with only one card for the pay week as with method No. 1, but in addition there is used a master card for summarizing the labour cost of all the workers engaged on each job or order.

METHOD NO. 3. Combined job and gate card—each worker being supplied with a separate card for each job or order on which he is engaged throughout the pay week. The times spent on each job and as shown by each card are entered on a summary in order to ascertain the total time for the pay week.

METHOD NO. 4. Separate gate card and job cards—each worker provided with a separate job card for each job or order on which he is engaged.

METHOD NO. 5. Separate gate card and one job card for week—each worker supplied with only one job card for use through the pay week.

METHOD NO. 6. One job card for each order—one job card used per job or order when a series of standard operations are performed, used either with or without a gate card.

METHOD NO. 7. Combined job card and machine running card—one job card per machine tool per week for analysing operator's time to each job, which also shows " time on production " and " idle time " of each machine tool.

METHOD NO. 8. Booking time direct on works instruction sheet or work ticket.

Full details of each of the above methods are given under the heading of " Booking Time to Jobs," and a selection of any of these will entirely depend upon the points already mentioned.

3. **Establishment Expenses.** The method used for recovering the establishment expenses in costs will depend upon the size of the factory and the nature of the work carried on. The methods most commonly used are known as—

1. Percentage on direct labour method.
2. Direct labour hour method.
3. Percentage on prime cost.
4. Departmental rate.
5. Machine rate.

The choice of any of the above methods, which are considered in detail under their respective headings, can only be made after a very careful investigation. (See also ESTABLISHMENT EXPENSES.)

4. **Cost Summaries.** The method that will be used for summarizing the individual costs will depend upon the nature

of the business, and the amount of information required by the management. In some cases the summary of a complete cost can conveniently be shown at the top of the Cost Account which is contained in the Job Cost Ledger, whereas with some industries it may be necessary to use special forms for this purpose. For instance, those firms which continually manufacture stock lines in either small or large quantities, will generally require their cost statistics in a form that will allow of easy reference. In such cases a card record system is often used, which is arranged to show the total and detailed costs of a complete order and the average cost of each article.

On the other hand, for those factories where the works order has been split up into sub-orders, a special form of cost summary is necessary. The object of these special forms will, firstly, be to summarize on one sheet the detailed material, labour, and expense items of each component, and, secondly, to arrive at the final cost of the whole order by summarizing the cost of each sub-order on to a final cost summary sheet. Specimen rulings of cost summaries are given under that heading, and reference should be made thereto in order to obtain an idea as to the general layout of such forms—no special ruling can be advocated, as the type of article and the method by which it is manufactured will invariably decide the actual form of summary necessary.

The results obtained from any costing system should be reconciled with the total expenditure as shown by the financial accounts, and for this purpose it is desirable that a proper system of cost control accounts be instituted so as to enable frequent and automatic reconciliation.

KNOEPPEL BONUS. METHOD OF REMUNERATING LABOUR. The daily rate is guaranteed, and it is calculated by adding to the standard time 25 per cent of the time taken and multiplying by the hourly rate. The bonus starts at 67 per cent of normal output with a " step " of 5 per cent at the standard, and the scale is slightly more liberal than the Emerson bonus up to 95 per cent. The usual danger exists in any system incorporating the guaranteed daily rate of the less ambitious workers not trying for the bonus.

It is claimed to be very flexible in application. A mild system and the " step " at standard output is a good feature.

The cost per piece produced is comparatively low, somewhere between that of the Gantt and Emerson schemes. (See also REMUNERATION OF LABOUR—METHODS OF.)

LABOUR CONTROL ACCOUNTS. (See Cost Control Accounts.)

LABOUR COST COLLECTING SHEET. A form on which the detailed amounts of direct labour are summarized in order that the total labour cost of a job, order or series of operations can be ascertained. The use of such a form is usually confined to those industries where the works or production order covers a large quantity of articles, or where a large number of workers are engaged upon a particular operation or process. In such cases a considerable number of items relating to direct labour require summarizing before the cost of the production order can be completed, and the use of a collecting or summarizing sheet for each element of cost will sometimes facilitate this process. The extent to which labour collecting sheets will be used and the form of ruling will depend upon the method of cost finding, the nature and size of the business, and the amount of information required by the management.

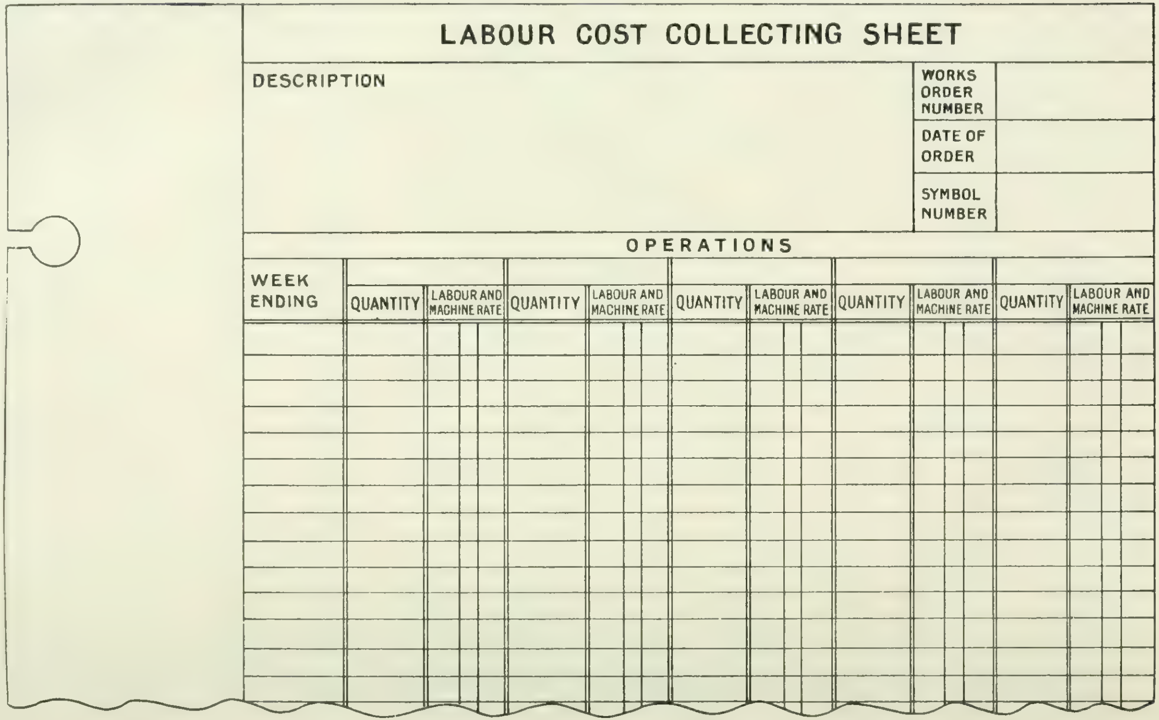
For instance, the summarizing of the labour amounts as obtained from the job cards may sometimes be done with the aid of an adding and listing machine, and the specimen labour collecting sheet, on page 176, illustrates the type of form used under such conditions. The final compilation of the labour cost of a job may be deferred until all the work on the particular order is completed, and in such cases the job cards when received by the Cost Department will be sorted and filed according to job number, so that on completion of the job the whole of the cards can be taken from the files and summarized by being passed through an adding or listing machine.

Alternatively, it may be the practice to summarize the labour cost each week, and in such a case the job cards will be dealt with exactly as above, and the weekly amount entered on the collecting sheet.

The illustration given overleaf allows for this procedure, as the date of the pay week is inserted in the left-hand column, and the amount relating to each operation entered in the appropriate column.

By using separate collecting sheets for both direct labour and direct materials, it enables the part cost of a job to be ascertained at any time. The use of such forms, however, will entirely depend upon the actual routine of the Costing Department and the nature of the work performed. For instance, instead of summarizing the direct labour as described above, the nature of the industry may be such that the various

Form No. 51.



LABOUR COST COLLECTING SHEET

DESCRIPTION	WORKS ORDER NUMBER	
	DATE OF ORDER	
	SYMBOL NUMBER	

WEEK ENDING	OPERATIONS									
	QUANTITY	LABOUR AND MACHINE RATE	QUANTITY	LABOUR AND MACHINE RATE	QUANTITY	LABOUR AND MACHINE RATE	QUANTITY	LABOUR AND MACHINE RATE	QUANTITY	LABOUR AND MACHINE RATE

kinds of labour will require to be summarized in the manner indicated by the further example of labour collecting sheet given on page 32. The ruling of this form is arranged to summarize the daily times of each worker and also give a weekly total, and is specially suitable for summarizing the labour cost of standard production, or where progressive totals are necessary.

The use of labour collecting sheets will usually be confined to the job method of cost finding, although in exceptional instances they will be found of advantage with process methods of costing, and especially where a departmental analysis of wages cannot be obtained from the pay roll.

LABOUR—INDIRECT. (See INDIRECT LABOUR.)

LAND—MAINTENANCE OF. The expense covered by this item, which will usually include the maintenance of all roads, paths, and fencing, etc., is collected through the system of service orders. The analysis of such expense will depend upon the nature of the work that is usually performed and the size of the property. With the small concerns, for instance, the expense is generally included with the maintenance and repair of buildings when the value of repairs to roadways, etc., is small, but with larger firms it may be necessary to segregate this expense from all building charges by using a system of service orders.

The cost of repairing the main roads is apportioned over all the factory departments, either arbitrarily or on the basis of the number of men in each department. This latter method, however, is unsuitable if the roads are also used by heavy traffic in delivering and dispatching goods or materials, and in such cases a more equitable distribution will be arrived at if the greater proportion of the expense is equally allocated to the Stores and Shipping Department.

The maintenance charges of footpaths and fencing, etc., may be apportioned arbitrarily or on the basis of "per employee," but in the majority of cases it will be preferable to include it with the maintenance charges of buildings.

LEGAL EXPENSES. Legal expenses of a general character are a charge to administrative expenses, which are ultimately apportioned over the Factory and Selling Departments, but those expenses which are incurred in the recovery of accounts may be allocated to selling expense if the amount involved should warrant it. (See ESTABLISHMENT EXPENSES.)

LIGHTING. The expense of lighting is a charge to establishment expenses, the amount being allocated to the factory, selling, and administrative sections either (1) arbitrarily, (2) on the basis of actual consumption obtained from meter readings, and (3) calculated on the basis of the total watts or candle-power or the number of lamps burnt in each department.

LIST PERCENTAGE PLAN—METHOD OF REMUNERATING LABOUR. This is an American variant of the cost premium. The foreman acts as a contractor and undertakes to supply labour at a fixed cost per unit of product. The labour cost is the equivalent of a percentage of the selling price, and is arrived at after a careful analysis of the cost figures ; for example, a foreman in charge of a department, where the normal labour cost per unit is 3 per cent of the selling price, would be credited with his output at this figure per unit. Any saving which he can effect is shared between himself and his men.

The two principal defects are that it concentrates on only one point of workshop efficiency—the efficiency of labour ; and, secondly, that as the labour cost is based on the selling price, there must necessarily be frequent adjustment owing to market fluctuations. (See also REMUNERATION OF LABOUR —METHODS OF.)

LOANS—INTEREST ON. (See DEBENTURES: MORTGAGES —INTEREST ON, also BANK OVERDRAFTS.)

LONG TERM EXPENSES. (See CONSTANT EXPENSES.)

MACHINE GROUPS. (See GROUP CENTRES FOR EXPENSE ALLOCATION, also MACHINE RATE METHOD OF RECOVERING FACTORY EXPENSES.)

MACHINE RATE METHOD OF RECOVERING FACTORY EXPENSES. In those industries where the manufacturing processes wholly or partly require the use of machinery, there may be used the " machine rate " method of recovering the factory expenses in costs.

This method is based on the principle that with the class of industriet referred to, the total factory expense is made up of two distinct kinds, and that all the expenses relating to the general running and upkeep, etc., of the machine tools, i.e. machine expense, should be recovered in costs separately from the remaining expenses of the factory departments.

The basis of recovery of a machine rate is the length of time each article, order or process has required the use of the machinery, and this method differs from the direct labour hour or percentage on direct labour method in that expenses are recovered as a machine rate instead of a percentage or rate per direct labour hour ; in other words, the running times of the machines form the basis of recovery and not the number of hours of direct workers or the amount of wages paid to them.

The machine rate method can rarely be adopted as the only basis for recovering the *whole* of the factory expenses, as there is usually one or more departments of exclusively hand work, or partly hand work and partly machine work, in addition to those departments that are entirely composed of machine work. A separate method, therefore, must be used for recovering those expenses which are not capable of direct allocation or apportionment to the machine expense, and in this direction a machine rate when used in combination with the direct labour hour method, for recovering the remaining departmental expenses, will undoubtedly give the more accurate results.

The calculation of a machine rate is effected by analysing the machine expense to each machine or group of machines, and then reducing the total to a rate per machine hour, by dividing it by the estimated number of hours each machine or group of machines should run throughout the period, and which may be expressed by the following formula—

$$\frac{\text{Total machine expense per machine or group of machines}}{\text{Total machine running hours per machine or group of machines}} = \text{Rate per hour per machine or group of machines.}$$

The predetermination of the total machine expense may be based upon the full normal running hours or upon a reduced number of hours during periods of trade depression, and the advantages of the former and objections to the latter methods are discussed under the general consideration of "Establishment Expenses."

Classification of Factory Expense. The extent to which the factory expense is classified into the two main groups of machine expense and general shop expense greatly differs in practice. In some instances the cost accountant will apportion every item of factory expense over the two accounts and, whilst such a detailed analysis is only necessary in a few exceptional cases, it is a practice which should not be followed indiscriminately, as needless elaboration renders the method far too intricate and expensive.

The analysis of rent expense, for instance, on the basis of floor space occupied by the machines is in almost every case unnecessary, as the amount chargeable to a machine will be found to be infinitesimal, as also shop cleaning and sweeping, lighting, general labouring, etc.

The items chargeable to the machine expense should, therefore, be limited to those expenses which have a *direct* bearing on the cost of running and maintaining, etc., the machines, and such expenses will chiefly consist of—

1. Cost of power.
2. Cost of repairs and maintenance.
3. An allowance for wear and tear and obsolescence.
4. Sundry supplies, such as lubricating and cutting oils, cotton waste, etc.

All the remaining items of factory expense are best dealt with as a charge to general shop expenses, and recovered in costs by the direct labour hour method on a departmental basis.

With regard to the few exceptional cases where a more detailed apportionment is necessary, it may be desirable to analyse the factory expenses, firstly, under the headings of—

1. Machine expense.
2. Material expense.
3. General shop expense.

Secondly, to deal with groups 2 and 3 according to the basis chosen for their recovery in costs ; for instance, if the whole expenses are to be recovered on the basis of a combined machine rate and material expense rate, then group 3 will require to be apportioned over groups 1 and 2. On the other hand, if the expenses are recovered as a combined machine rate and a direct labour hour rate, then group 2 may either be apportioned over groups 1 and 3 or the total included with group 3.

Assuming the factory expenses to be classified into the two headings of machine expense and general shop expenses, the respective amounts are, firstly, analysed to departments, and the departmental total of the machine expense is then directly allocated or apportioned to the respective machines or group of machines in each department as follows—

1. Cost of Power. The power consumed by the machines is capable of direct allocation on the basis of kilowatt hours consumed ; alternatively, if the actual consumption of each machine is not recorded, the amount can be apportioned on the basis of the horse-power required when running on full load.

2. Repairs and Maintenance. The expense of repairs and upkeep, etc., which will include the maintenance of the equipment and small tools used by each machine or group

is ascertained and analysed by means of a system of service orders.

3. Wear and Tear, also Obsolescence. The amount of depreciation of each machine is easily obtainable from the plant or machinery record.

4. Sundry Supplies. The amount of sundry supplies required for the machines is obtained through a system of service orders, but in many instances the value of such supplies may be small and it may, therefore, be desirable to charge this expense to the service orders relating to repairs and maintenance.

Classification of Machinery. The classification of machinery for the purpose of using a machine rate will be more or less arbitrary, depending upon the nature and size of the concern and the class and type of machinery used. With well organized factories a broad classification may already exist by way of departments which may be sufficient for a small or medium-sized works, but with the larger concern it will usually be necessary to subdivide the machine tools according to functions, for instance, the departmentalization of the small factory may be such as will only give the classification of machines as—

Light machine shop.
Heavy machine shop, etc., etc.,

whereas with the larger concern the departments may be arranged as follows—

Lathe Department.
Milling Department.
Drilling Department.
Planing Department.
Grinding Department.
Buffing and Polishing Department, etc., etc.

In the case of the former the machinery used in the light and heavy machine shops will require subdividing, according to functions, which may be—

Light Machines.	Lathes.	Automatics.
	,,	Engine.
	,,	Screw-cutting.
	,,	Capstan, etc., etc.
	Drills.	Bench.
	,,	Single.
	,,	Multiple, etc., etc.
	Milling machines, etc., etc.	

HEAVY MACHINES.
Planing machines.
Boring machines.
Slotting machines.
Radial drills.
Grinding machines, etc., etc.

With the very large concern, and where the factory departments practically coincide with each kind of machinery used, the sub-classification may, firstly, take the form of type, and, secondly, the size or capacity; for instance, the Lathe Department may comprise a variety of different types of lathes, such as capstans, engine, automatics, gear cutting, etc., and each of these types may then be classified according to capacity. In the case of turret lathes, this sub-classification may be—

Symbol.	Swing.	Length of Bed.
TA	10–15″	4–7′
TB	12–16″	8′
TC	16–18″	7′–10′6″
	etc., etc.	

It should be noted, however, that the above remarks regarding the classification of machinery are only given to illustrate the variety of methods that are used, as the extent to which the machinery will require to be classified in any particular factory will entirely depend upon the number of machine tools in use, their type and size, etc.

Calculation of a Machine Hour Rate. Assuming that from the estimates prepared as above the expenses have been analysed into a machine expense and general shop expense as follows—

ITEM.	Total.	Light Machine Shop.	Heavy Machine Shop.	Fitting.	Testing.	Etc.
Machine Expense	£28,965	£9,275	£14,050	£3,732	£1,908	—
General Shop Expense .	£27,487	£7,812	£4,025	£9,150	£7,500	—
Normal Maximum Machine Hours . .	138,600	50,000	38,000	45,000	5,600	—
Direct Labour Hours . .	228,000	75,000	42,000	61,000	50,000	—

The above figures show the expense analysed to departments, and in those cases where a variety of machine tools are used, the next step will be to analyse the machine expense to the respective classes of machine tools as follows—

LIGHT MACHINE SHOP

Expense.	Total.	Automatic.	Engine.	Gear Cutting.	Etc.
Machine Expenses . .	£9,275	£3,600	£675	£5,000	—
Machine Running Hours .	50,000	24,000	6,000	20,000	—
Machine Hour Rate .	—	3/-	2/3	5/-	—
General Shop Expense .	£7,812	—	—	—	—
Direct Labour Hours .	75,000	—	—	—	—

The general shop expense rate for each department will next be calculated, and the direct labour hour rate for the light machine shop, for instance, would be as follows—

$$\frac{\text{£7,812}}{\text{75,000 (direct labour hours)}} = \text{2/1 per direct labour hour for the light machine shop.}$$

The machine hour rate to be added to costs would, therefore, be at the rate of 3s. per hour for the number of hours the automatics are used on an order; 2s. 3d. per hour for engine lathes, and 5s. per hour for gear-cutting lathes, etc.

The direct labour hour rate for the department, i.e. 2s. 1d. per hour, will next be added to the cost by multiplying the total direct labour hours of the direct workers engaged in operating the machines or performing other work on the job, such as bench work, fitting, etc., which has not required the use of machinery.

It will be seen that when the machine rate is used in conjunction with the direct labour hour method, the combination provides for the varying conditions of production, and especially in those cases where the machine tools used on each order vary as regards type and length of period in operation. For instance, a works order may require the use of expensive machinery to a much greater extent than another, whereas others may only partly require the use of the cheaper rated machines. Furthermore, due allowance will be made in those cases where two or more men are in charge of the one machine tool. As an example, assume one man in charge of a planing machine and that the cost of the operation is as follows—

	£ s. d.	£ s. d.
Materials	15 – –	
Direct Labour—		
One man, 136 hours at 2/6 per hour	17 – –	
		32 – –
General Shop Expense—		
Direct labour hours: 136 at 2/– per hr.	13 12 –	
Machine Expense—		
136 hours at 3/9 per hour . .	25 10 –	
		39 2 –
TOTAL FACTORY COST .		£71 2 –

Again, assume the same operation, but in this instance two men are in charge of the machines—

	£ s. d.	£ s. d.	£ s. d.
Materials		15 – –	
Direct Labour—			
One man, 136 hrs. at 2/6 per hr.	17 – –		
One man, 136 hrs. at 1/– per hr.	6 16 –		
		23 16 –	
272 hrs.			38 16 –
General Shop Expense—			
272 hours at 2/– per hour		27 4 –	
Machine Expense—			
136 hours at 3/9 per hour . .		25 10 –	
			52 14 –
TOTAL FACTORY COST .			£91 10 –

It will be noted from the above that the machine hours are the same in each case, but that the number of direct labour hours has increased with the second example, owing to the fact that two men are employed.

The advantage of this method, which provides for the varying conditions, is clearly shown by the addition of an extra amount of the general shop expense. The advantage of a combined machine rate and direct labour hour rate for general shop expenses over the direct labour hour method will now be apparent, as the combined method makes every allowance for a job that partly or wholly requires the use of machinery, and one that may be wholly or partly hand work.

MACHINERY—DEPRECIATION OF. The amount of depreciation which relates to producing machinery is included among factory expenses. When a large number of machine tools are in use, and the machine rate method for recovering expenses in costs is employed, the depreciation charge will require to be analysed either to departments, groups of machines, or to individual machines, and for this purpose a record of each machine, which may be ruled similar to the plant record shown on page 235, must be used.

MACHINERY—RECORD OF. (See PLANT RECORDS.)

MACHINERY—REPAIRS AND MAINTENANCE OF. The expenditure incurred in maintaining and keeping in good order all producing machinery will be dealt with in costs according to the amount of machinery used; for instance, with the smaller concern the repair and maintenance charges may be debited *en bloc* to the factory expense, and recovered as a general charge over the whole output, whereas with larger concerns it is usually desirable, owing to the largeness of this expense item, to analyse all expenditure by means of service orders either to each department, machine tool, or group of machines.

The method used for recovering factory expenses in costs will also affect the method of analysing repair charges, as the employment of a machine rate requires that expenses of each machine or group be ascertained separately.

The analysis of repair charges by means of service orders is regarded as the best method when a large number of machine tools are in use, and in connection therewith there will generally be used a machine record card, ruled similar to the plant record card, for each machine tool, so that the total cost of upkeep can be recorded together with other charges for depreciation, etc.

The expense of repairs and maintenance will generally fall into two divisions—

(*a*) Repairs which occur daily, such as to small tools, miscellaneous equipment, belting, etc.

(*b*) Repairs of an extraordinary character, the cost of which is more correctly distributed over a long period of time. This expense may include the replacement of certain parts or work done which exceeds a predetermined figure.

The question of depreciation may sometimes affect the method of dealing with repairs and maintenance charges, as it may be the practice to debit such charges to Depreciation Account for the reason that when establishing depreciation rates, the estimated cost of repairs and maintenance was taken into consideration. (See also REPAIRS AND MAINTENANCE.)

MAINTENANCE. (See REPAIRS AND MAINTENANCE.)

MAN HOUR METHOD OF RECOVERING EXPENSES. (See DIRECT LABOUR HOUR METHOD OF RECOVERING EXPENSES.)

MANUFACTURED GOODS—REJECTION OF. The routine involved in connection with the recording of rejections or spoilt work will not only vary with the class of trade that is being carried on, but the volume of output, class of labour employed, and internal production methods will demand that each concern within an industry must have its special method.

For the purpose of collecting and tabulating the cost of rejections, the "rejection note" issued by the Inspection Department or view room may, in the majority of cases, form the basis of compiling this record, but here again, the nature of the industry may be such that a rejection note is unnecessary.

In the manufacture of electric lamps, for instance, the rejects are thrown out at the end of each operation or process and the record appears on the "control," a form similar to the work ticket of an engineering factory, excepting that all the processes are shown thereon. On the other hand, certain operations in an engineering works are recorded on the job card or work ticket, which also has spaces for noting the quantities good and rejected. It will, therefore, be seen that the problem of costing spoilt work or rejections is one that can only be dealt with in general terms.

Most systems of costing must provide for the recording of spoilt work at the completion of the individual operations, and this can be effected in a variety of ways; for instance, if the piece work or bonus methods of payment be used, this record can easily be obtained from the job cards or work tickets according to system, but with the process industries the amount of spoilt work or rejects may not be ascertainable until the end of a period such as a week or month, etc.—the period depending upon the length of time it takes to complete the process. In such cases the amount of rejects will be obtained from the Process Cost Account, and it may be represented by the difference between the total materials put into the process at the beginning of the period and the net amount taken out at the end of the period. On the other hand, the process may be such that other losses will occur during manufacture as, for instance, losses due to evaporation and conversion, etc. The amount or value of spoilt work could, therefore, only then be ascertained by actual counting or weighing of the defects.

The recording of defective or spoilt work during process of manufacture is extremely difficult, and great care must be exercised in devising any system for this purpose, otherwise a considerable amount of duplication of clerical work will result. As a general guide in this direction, however, one may safely weave the system with the method of inspection and viewing, also booking time to jobs (if day rate method of payment is not used), as the point of inspection will invariably provide the desired information.

The inspection of the *completed* article, however, provides an easy means of collecting statistics in regard to defects or spoilt work, and in those industries where the article produced is capable of (and requires) individual inspection or test before being placed in the finished stores, the use of an " inspection certificate," ruled similar to the specimen given under its name, will generally be employed as a means of notifying the departments concerned that the particular goods have passed final inspection. Such a certificate also serves the purpose of advising the Cost and Planning Departments when all work on the production order is completed.

Form No. 52.

	REJECTION NOTE DATE..	**Credit** ADVICE NOTE NO. **Works** ORDER NO.
SEND THIS COPY TO PLANNING DEPT.	REASONS FOR REJECTION—	
	RETURN GOODS TO	REJECTED BY ....

With regard to the rejection of those articles which do not come up to the desired standard, a "rejection note," ruled similar to the specimen given, will be made out in place of the inspection certificate, and the copies thus distributed—

First copy may be attached to the rejected article and for this purpose may be in the form of a tie-on label.

Second and third copies sent to Planning Department.

Fourth copy may be provided for the Inspection Department, and will serve as their permanent record.

The object in sending two copies to the Planning Department is to enable them to notify any other department concerned. This method is to be preferred when the Sales Department only require notification that certain goods have been rejected, and the Stores Department of general stock items. On the other hand, neither of these departments may be concerned with the particular rejection, and in such a case the Planning Department will deal with the matter accordingly by sending the copy to the department interested.

The recording of rejected goods in the Cost Department is important, and a copy of the rejection note may be provided for this department ; alternatively, the planning copy can be passed to the cost office, who will note on their records that a certain item has been rejected.

With some industries the nature of the articles produced may be such that they will not lend themselves to rectification, and the rejection will then be treated as a total loss. In other cases the cost of rectifying, etc., will be recorded in the cost accounts by either of the following methods—

Standard Stock Items. The cost of rectification should be charged to a special service or standing works order suitably analysed to show the cause of the expense. A reject may arise through faulty design, faulty workmanship, faulty materials, or unsuitable production methods, and the analysis of the service orders may be arranged accordingly, as also to show the cost incurred in each department.

Special Articles Made Against Customers' Orders. The cost of rectifying faulty goods made to a customer's special order should be charged to the production or works order on which the articles were originally made, as the object now is to collect all the information relative to the cost of the particular item, so that sufficient data will be available in case a repeat order is received and a revised sales price is to be quoted.

The actual treatment of the cost of defective goods will naturally differ according to the size of each concern and the value of such defects over a period. The small concern may not require the expense analysed to the same extent as the larger concern. In either case, however, the system of "service orders" will usually form the medium of collecting all expenses in this direction. (See also INSPECTION CERTIFICATE, WORK TICKET, also GOODS RECEIVED—REJECTION OF.)

MANUFACTURING COST. (See FACTORY COST.)

MANUFACTURING DEPARTMENTS, or productive departments, may be said to be the natural process divisions of any business, and, as the qualification infers, covers direct manufacture. There are three elements of expenditure in any manufacturing department, viz.—

1. Labour, being direct wages paid.
2. Materials—used in direct manufacture.
3. Factory expenses.

(See also DEPARTMENTALIZATION.)

MANUFACTURING EXPENSE. A term frequently used when referring to the indirect expenses of a factory, which consist of all charges other than direct labour or direct material. (See FACTORY EXPENSES.)

MATERIAL ALLOCATION CARD. (See STOCK RECORD CARD.)

MATERIAL COST COLLECTING SHEET. A form on which the detailed amounts of materials are summarized in order that the total material cost of a job, order or process can be ascertained. The use of such a form is usually confined to those industries where the works or production order covers a large quantity of articles, or where a considerable number of items require summarizing before the material cost of a works order can be completed. The extent to which material collecting sheets can be used and the form of ruling depends upon the method of cost finding, nature and size of the business, and the amount of information required by the management.

For instance, if bills of material are in use, a material collecting sheet will rarely be necessary, as the summarizing of the materials consumed can then be made upon the bill of material, but in those cases where this procedure cannot be followed, the material collecting sheet will often be useful, especially when it is desired to ascertain the value of materials consumed on a part finished order.

The procedure to be used in writing up the material collecting sheet will naturally depend upon the routine of the Cost Department, as the cost of an order may not be compiled until all the work on the order is finished. In such cases the stores requisitions, when received by the Cost Department, are sorted and filed according to the works or production order number, and upon being notified that the order is completed, the whole of the stores requisitions may be summarized with the aid of an adding and listing machine, and a final total obtained by the one operation.

With such a method in use, a material collecting sheet will not be required, but in those cases where it is the practice to summarize the value of materials issued against each order each week, provision must be made for collecting the weekly amounts.

The specimen material collecting sheet given is used with such a method. The date of the week is entered in the left-hand column, the total quantity and value issued for that week inserted under the " issued " column, and the total " to date " then ascertained and extended in the third column.

When the value of materials used on an order is collected each week in the above manner, it is desirable that the day of the week should coincide with that used for labour collecting sheets. In other words, the date of the pay week should be used in both cases.

MATERIAL LIST. (See Bill of Material.)

MATERIAL REQUISITION. A term occasionally used when referring to an order on the storekeeper to issue certain goods for use in the works, also as advice to the buyer that certain materials are required and that they must be purchased. The term " material requisition " should, therefore, never be used unless qualified in some particular way as " material purchase requisition " or " issue requisition."

The terms " purchase requisition " and " stores requisition " are to be preferred.

MATERIAL TRANSFER NOTE. (See Stores Transfer Note.)

MATERIALS — CLASSIFICATION OF. Invariably in manufacturing businesses materials—forming the basis of manufacture—comprise the greater portion of expenditure. Manufacturing might be termed as the art of making changes in the substance of material by the application of labour and machinery. Alteration to, a combination of, or the reconditioning of material are the chief functions in manufacturing, and the aim in factory cost is concerned then with the determination, in detail, of the cost of production of all articles, processes, alterations, etc.

Form No. 53.

MATERIAL COST COLLECTING SHEET

DESCRIPTION	CLASS OF MATERIAL		WORKS ORDER NUMBER	
	WEIGHT FOR		DATE OF ORDER	
	MATERIAL SPECIFICATION NUMBER		SYMBOL NUMBER	

WEEK ENDING	ISSUES FROM STORES						DIRECT PURCHASES			
	QUANTITY	VALUE	TOTAL VALUE TO DATE	QUANTITY	VALUE	TOTAL VALUE TO DATE	VOUCHER NUMBER	£	s	d

There are various kinds of changes performed in material, viz.—

(*a*) When material remains the same as purchased, nothing being added to or taken from it, except the possibility of waste caused by deterioration, shrinkage, etc., the materials being changed in form or size.

(*b*) It may be split up in the process of manufacture, and various by-products extracted from it.

(*c*) It may be added to other different materials in the course of manufacture, or combined with the same material in some other form or substance.

In manufacturing activity one is concerned generally with materials under the following headings—

1. Raw materials and components required for actual manufacture.

2. Materials required for the manufacture of goods to customers' special requirements.

3. Sundry expense or indirect materials, machinery, and spare parts for repairs and renewals to plant, fuel, oil, coal, petrol, grease, packing materials, etc.

The materials referred to under 1 and 3 might be termed as general stock materials, meaning that constant and adequate supplies must always be kept in stock to meet the demand covered by the general policy pursued in the course of manufacture in the factory concerned.

Regarding materials under 2, viz., those required for the execution of customers' special orders, they can be defined as follows—

(*d*) Raw materials and partly finished goods on which further labour and machining have to be expended.

(*e*) Materials or goods resold to customers in the same condition as purchased by the manufacturer.

(*f*) Sundry indirect or expense materials such as tools, spare parts, fuel, etc.

In the case of (*d*) and (*e*), these materials would be purchased as and when the demand necessitated, and the question of adequate supplies would not apply under these headings. Concerning (*f*) (sundry indirect or expense materials), these would be drawn from the works' general supply.

Correct classification of all materials purchased is of paramount importance, and the accountancy involved will obviously be complex, or simple, according to the amount of details that it is desired to record.

With many concerns the nature of the trade carried on will be such that a more detailed classification than that given above will obviously be required, but owing to the great diversity of methods and kinds of materials used, etc., by the respective firms, no form of classification can be given that will be suitable under all conditions.

The broad groups given above, into which materials may be classified, will, however, be sufficient to indicate the general principles underlying the work of material classification, and any sub-classification will be determined by the conditions that prevail at each factory. For instance, with some concerns the nature of the business carried on may require that the raw materials and parts used for actual manufacture (group 1) will be further analysed as—

(i) Raw materials ;
(ii) Bought out supplies ;

and each of these subdivisions analysed either according to the class of material, such as brass: bars, sheets, etc. ; copper: bars, sheets, etc. ; steel: high speed, tool, etc. Alternatively, the main subdivision may firstly have regard to the form or shape, and secondly, the class, i.e. bar metal, brass, copper, etc., sheet metal, brass, copper, iron, etc.

With regard to (ii), the definition given to parts or bought out supplies is found to differ in practically each case, as some firms will regard, say, screws, washers, nuts, and bolts, and various other kinds of ironmongery or hardware, as raw materials, whereas others will classify such items as bought out supplies. The latter classification is the more correct if work is not done *on* the actual items in question. Such parts as screws, washers, nuts, bolts, and the like will usually be *assembled* on the product and, whilst they may be regarded theoretically as " raw " materials, they differ considerably from that class of material which is formed or shaped into the desired article. From both a costing and manufacturing point of view, a clear distinction must be made between such classes of materials, otherwise valuable information will be merged with other figures which really have no inter-relation. With some concerns, for instance, the total " raw " material consumption over a period may appear to represent a fairly substantial amount of production, when compared with other data, such as the direct wages paid, etc., but if the item of raw material were to include only such materials as are worked upon for the specific purpose of changing their form or shape, or combining with other materials in order to produce a saleable product, and were all such items as washers, rivets, screws, bolts, nuts, and the like classified as bought out supplies, a very different statement for comparative purposes may result. In such a case the comparison of the respective totals of the two classes of materials consumed would obviously require that the direct labour be analysed to show the amount spent on assembling and fitting, etc., as distinct from the labour performed on the purely manufacturing processes.

The distinction usually given to materials for purely costing purposes, namely, direct and indirect materials, will not necessarily affect the basis of material classification now under consideration, because many of the items which will be included in group 1 above will be drawn from stores for use on service or standing works orders in addition to those materials that comprise group 3. The quantity or value of indirect or expense materials consumed during any period will, therefore, be ascertained through the system of service orders, which can be arranged to give such further classification as may be found necessary.

MATERIALS CONTROL ACCOUNT. (See COST CONTROL ACCOUNTS, also STORES—FINANCIAL CONTROL AND PERPETUAL INVENTORIES.)

MATERIALS—METHODS OF PRICING. (See PRICING STORES REQUISITIONS—METHODS OF.)

MATERIAL SPECIFICATION. (See BILL OF MATERIAL.)

MATERIAL SUMMARY. (See MATERIAL COST COLLECTING SHEET, also COST SUMMARIES.)

MAXIMUM OUTPUT—BASING EXPENSES ON. (See ESTABLISHMENT EXPENSES.)

MAXIMUM STOCK. The term used when referring to the maximum quantity of stock that should be on hand at any time. The fixing of a maximum stock sets a justifiable limit to the amount of stock which should be on hand.

In conjunction with the maximum stock there will always be used a minimum stock, being the quantity below which the stock must not be allowed to fall.

For details as to the fixing of maximum and minimum stocks, also the object of operating stocks upon a minimum-maximum basis, see MINIMUM STOCK.

MERRICK DIFFERENTIAL OR MULTIPLE PIECE RATE. METHOD OF REMUNERATING LABOUR. The daily rate is not guaranteed under this method of remunerating labour. There are three piece rates, the first of which is a straight piece rate which is applicable up to 83⅓ per cent standard of output at which point there is an immediate increase of 10 per cent, which is added to the straight piece rate, and is the second piece rate used and is effective to 100 per cent output. At this point there is a further 20 per cent increment, and this forms the third piece rate beyond the 100 per cent standard. This multiple piece rate method can be adjusted almost indefinitely ; for example, the first step can be an increment of 5 per cent and the second increment 15 per cent, in which case there is a much stronger inducement to attain standard output. Owing to it being based on very accurate time studies, it is rather complicated and slow in installation and perhaps not easy for the worker to comprehend.

Furthermore, unless some form of arithmetic slide rule be used, extra clerical help will be required. Its principal advantage is that it is not so harsh as the Taylor differential on operatives of low efficiency.

The effect on the cost per piece produced is as marked as in the latter. (See also REMUNERATION OF LABOUR—METHODS OF.)

METAL CHECKS. With small factories a record of the attendance of employees is sometimes obtained by the use of metal checks. Each worker is provided with a brass check on which is stamped his number, called a check number. The checks are hung on boards in numerical sequence and placed at or near the entrance to the factory. As each worker enters the premises, he lifts his check from the board and drops it into a box and proceeds to his work. At predetermined times, usually a few minutes after starting times, the time clerk or gatekeeper removes the checks from the box and enters their numbers on to a sheet or time book The checks remaining on the board are next entered on a "Late or Absentee Report," and the two records then passed on to the wages clerks, who write up the pay roll from these lists.

The above method offers very little advantage over the "Time Book" method. Disputes will arise in many instances, and these can rarely be settled to the workman's satisfaction, owing to the absence of a reliable written record. It is not uncommon also for a workman to "lift" his absent friend's check from the board and drop it into the box with his own, thus registering the attendance of absentees.

Metal checks are sometimes used in connection with other methods of time recording, particularly when a worker has a fair distance to walk between the gate or time office and his bench or machine. In such cases the worker will clock "on" his card at the gate and then lift his check from a board. On arrival at his department or bench his check is dropped into a box. The foreman or his clerk collects the checks at stated times. The object of this method is to check any waste of time through loitering, etc.

Checks are also used by some concerns as a means of identification on pay days. Each workman takes his check from a board which is placed in his department, and proceeds to the pay clerks, handing the check to them in return for his pay envelope.

METHODS OF COST FINDING. (See Cost Finding—Methods of.)

METHODS OF REMUNERATING LABOUR. (See Remuneration of Labour—Methods of.)

MINIMUM OUTPUT—BASING EXPENSES ON. (See Establishment Expenses.)

MINIMUM STOCK. A term used to denote the quantity below which the stock should not be allowed to fall, and the limit below which the normal demands of the factory could not be met.

The fixing of a minimum stock figure will be determined by the nature of the item, the rate of consumption, and the longest period required to obtain an economical quantity. With regard to the nature of the item a minimum quantity can only be fixed for those materials which will be in continuous demand by the factory for general production, as other items which may be required to complete a customer's special order will only be purchased as and when required. The minimum stock figure will, therefore, only relate to standard raw materials and parts for manufacturing and for general use on service or standing works orders.

In conjunction with a minimum stock there will be used a maximum stock, which sets a justifiable limit to the amount of stock which should be on hand at any time.

The object of operating stocks of materials on a minimum-maximum basis is twofold, namely, to prevent the holding of excessive or inadequate stocks, and as both are inter-related they may be considered simultaneously. One of the greatest forms of waste in industry is the uneconomical and excessive buying of materials which invariably results in the " locking up " of too much capital and the " writing off " of losses at the end of each financial period through obsolescence and falling prices. On the other hand, the failure to stock an adequate supply of materials, sufficient to meet general manufacturing requirements, leads to unnecessary and costly delays in the factory. The need for some means of controlling the quantities of standard materials that should be held in stock at any time is, therefore, evident.

The rules to be observed in the calculation of minimum and maximum quantities are simple. Firstly, the average rate of use is considered, and secondly, the period of time required —taking the longest period, not the average—to obtain the economical quantity. The minimum stock or quantity below which the stock should never be allowed to fall is then represented by the quantity (plus a margin for safety) of the article which will meet the normal demands of the factory whilst the quantity ordered is being obtained.

The " maximum stock " is taken at something above the totals of these two, but it may be limited by financial considerations.

Great care is needed when fixing the above limits, as it will be seen that if the minimum figure has been set so as to be certain that sufficient material will be always available, there may be an inclination to over-stock, whereas if the minimum is fixed with a view to keeping stocks as low as possible, there may be periods when consignments will be delayed. To overcome the possibility of this trouble arising, a " re-order " point may be fixed which corresponds to the minimum quantity. When the stock of any item falls to the " re-order quantity," therefore, a purchase requisition is then issued instead of waiting until the quantity falls to the minimum.

The minimum stock is set below this " re-order quantity," and then becomes the real danger point.

The minimum, maximum, and re-order figures must be noted on the bin cards and stock record cards.

MISCELLANEOUS DEPARTMENTS. (See DEPARTMENTALIZATION, also SERVICE DEPARTMENTS.)

MORTGAGE CHARGES. (See MORTGAGE—INTEREST ON.)

MORTGAGES—INTEREST ON. The treatment of interest on mortgages in cost accounts will depend upon the actual circumstances of each case ; for instance, where a business requires a loan for a short period in order to complete some special or specific contract, the interest payable thereon must not be allocated to establishment expenses and recovered amongst the various indirect items over the whole output of a factory, but should be a direct charge to the job or contract for which the money was specially required.

In those cases where a business issues a mortgage on its factory and office buildings and land for the purpose of obtaining additional working capital, the interest charges thereon may be dealt with by either of the following methods—

(*a*) To regard interest as a general charge to the business and include among the establishment expenses.

(*b*) To regard the interest payable as a charge against gross profits and exclude it from the cost accounts.

As a Charge to Establishment Expenses. When this method is used the amount of interest is firstly allocated to the administrative expense, which, in turn, is then arbitrarily apportioned over both the Factory and Selling Departments, according to the extent it is considered each will benefit therefrom.

Each case, however, must be considered upon its own merits, as it may be that a larger portion of the extra capital will be spent upon, say, advertising, and only a small amount actually used in production. In such a case it would obviously be incorrect to charge the interest to the Factory and Selling Departments in equal proportion. On the other hand, if the greater part of the money is expended in new plant, then the factory should bear its correct share of the expense.

As a Charge Against Gross Profits. When mortgage interest is regarded as a charge against the gross profits of a business, the item is transferred direct to the Profit and Loss Appropriation Account, and does not appear in the cost accounts.

The treatment of mortgage interest should be regarded from a different viewpoint to interest on capital or on debentures, as a business that has sufficient working capital will rarely, if ever, issue a mortgage upon its premises. It may, therefore, be safely assumed that the issue of a mortgage will usually follow on the failure to raise additional working capital by the more general manner, i.e. by the issue of shares.

From the above it will be seen that the correct treatment of interest on mortgages depends upon the circumstances under which they are issued. The interest payable on mortgages that are issued for long periods, and for the purpose of providing finance for the business generally, is more correctly a charge against the gross profits of the business and should not, therefore, appear as an item among the establishment expenses.

The treatment of mortgage charges in the manner indicated may appear a controversial point to some minds, but it is argued that the circumstances which necessitate the issue will decide the method of treatment in the cost accounts.

When money is raised by this means, and simply because the working capital of the business has been reduced through the purchase of additional assets, or dissipated through losses made in previous years, the increasing of the cost of manufacture by charging interest to costs is not justified.

For a general consideration of "interest as an item of cost," see INTEREST ON CAPITAL.

MOVE TICKET. (See WORK TICKET.)

MULTIPLE COSTING. (See COST FINDING—METHODS OF.)

NATIONAL HEALTH INSURANCE. The amount of the employer's contribution forms part of the establishment expenses of a business, and the amount is allocated direct to the Administrative, Selling, and Factory Departments. This analysis is very easily effected, as the salaries list or pay roll will give the actual figures each week. In those cases where the factory expenses are analysed by departments, the pay roll should be arranged departmentally wherever possible, so that the amount of the employer's contribution per department will be easily ascertained.

When departmental analysis of the pay roll is not possible, the amount is sometimes apportioned arbitrarily, but with large concerns actual analysis must be made of this expense item.

"NATIONAL" TIME RECORDERS. A series of "National" machines to serve the dual purpose of timekeeping and costing are available. The machine usually employed for costing is that known as the Clipit type, and is capable of recording the time spent on jobs for either long or short duration, whilst at the same time, by using a different coloured card, the machine can be used for ordinary timekeeping.

Another machine, specially manufactured for printers' costing, but equally useful in other trades, is known as the Universal Time Recorder. This machine will record the time and date on ordinary sheets of paper of any size, the time printing being in position within 3 in. of the margin. The great advantage of this particular model is that where a firm has time sheets in operation, they can adapt the mechanical system without interfering with their existing routine.

Still another type of recorder is the Portable Costing Recorder, which is made with a strong lever escapement, and can be moved from place to place without in any way interfering with the working of the clock. This machine can also be used with either cards or works instruction sheets and, like the Clipit Recorder, can be used equally as well for timekeeping as for costing.

NORMAL MAXIMUM OUTPUT CAPACITY—BASING EXPENSES ON. (See Establishment Expenses.)

OBJECTS AND ADVANTAGES OF COST ACCOUNTANCY. If a system of cost accountancy is to be of any real value to the manufacturer, it must be far more than a mere branch of ordinary financial accounting. Ordinary accounting deals with the *external* transactions of a business from a purely financial point of view, and in all cases in bulk and in terms of cash; whereas cost accountancy deals with the *internal* transactions, and from the point of view of manufacture and distribution.

A costing system must accommodate many other problems besides purely monetary values. It must deal in terms of efficiency, time, weight, volume, etc., and connect the manufacturing operations with the financial transactions by interpreting the former in terms of cash.

The objects of costing may, therefore, be stated as—

1. To determine the actual cost of each article, process or operation.
2. To compare the actual cost with the estimate.
3. To provide statistical data in the form of reports and statistics so that a factory can be managed on the basis of facts.
4. To reconcile with the financial accounts in terms of true cost the expenditure incurred and charge it to production, distribution, and management.

The advantages derived from the use of a good costing system are—

1. The amount of profit or loss on the manufacture and sale of different products can be ascertained and localized.

2. By making it possible to compare the actual cost with the estimate, it enables future estimates to be prepared with more reliance, and provides a sound basis for establishing sales policies and prices.

3. The management of a business is aided by the information made available by a good system of costing, as the efficiency of each department can be examined and compared with that of others.

4. The provision of accurate and detailed costs enables the business to be managed and controlled efficiently, as excessive costs, waste, and unremunerative expenses can easily be detected and eliminated.

Three clearly defined branches of cost accountancy have now been indicated, namely—

1. **Cost Finding,** which relates to the method used to ascertain the detailed and total cost of any desired article, process or service.

2. **Cost Control,** which provides, firstly, the means of controlling in detail and total all expenditure incurred in connection with production, distribution, and management ; and, secondly, the basis for reconciling the total cost with the financial accounts.

3. **Cost Estimating** is the predetermination of the probable cost of an article, process or service when incurred under given conditions.

OBSOLESCENCE. (See DEPRECIATION.)

OFFICE EXPENSES. (See ESTABLISHMENT EXPENSES.)

OFFICE FIXTURES AND FITTINGS comprise such items as desks, tables, shelves, racks, and partitions, etc., when not forming part of the main building structure.

The value of office fixtures is part of the capital assets of the business. The cost of their repair and maintenance is charged to establishment expenses and allocated direct or apportioned to the Administrative and Selling Departments' Expense Accounts.

When the amount expended on repairs is large, the cost is then collected by means of a system of service orders which, as far as possible, should show the expense incurred by each department separately. In the case of small concerns, it is often more desirable to regard fixtures and fittings as part of the main building and to include the repair charges among the repairs to buildings. (See also FIXTURES AND FITTINGS.)

OFFICE ONCOST. (See ESTABLISHMENT EXPENSES.)

ONCOST METHODS. (See ESTABLISHMENT EXPENSES.)

ONCOSTS. (See ESTABLISHMENT EXPENSES.)

OPERATION METHOD OF COST FINDING. The operation method of cost finding is a term that is very often used to indicate the job costing method when applied to the costing of goods by " operation " rather than by the piece or quantity. With many engineering works this type of costing is used as well as the ordinary job costing method, as it will sometimes be found more convenient to cost certain articles or parts according to the operations performed on them, and particularly in such cases where certain articles or parts must be stocked in a partly finished state for convenience in making up special orders.

With some industries many operations are the same up to a certain point, when the goods are then placed into stock in their semi-finished state. The articles are then drawn from stock when the final operation is performed to meet the special requirements of the different customers. In such instances the operation cost method is necessary, as the finished state of the product cannot be ascertained until after receipt of the customer's order.

In certain kinds of wood-working plants, especially those that machine small quantities of timber to customers' requirements, the operation method can be used to advantage, as the cost of most operations, such as planing, sawing, moulding, etc., is more easily figured by the lineal foot or other suitable basis, owing to the small amount of machining required.

The use of special purpose machinery is another instance where the " operation " method of costing is specially suitable due to the uniformity of the work performed, and in this instance it should be noted that an operation need not necessarily be restricted to the one kind of material, provided the nature of the operation is such that the cost can be calculated on the basis of speed or stroke, and by the quantity, such as per lineal measure, per piece, etc. In the manufacture of rivets, for instance, the special machines used for this purpose may turn out a complete rivet at each revolution. The cost of the operation may, therefore, be figured on the basis of the number of revolutions per hour, as the operating efficiency of the machine is governed by the number of revolutions. The variation in speed of output brought about by the use of different kinds of materials would, therefore, be taken into consideration.

With the above method of costing the " job " covers the individual operation instead of the complete article or piece of machinery, and we therefore still have the job costing method, but with a different unit of output to that usually associated with the more general form of job costing. (See also Cost Finding—Methods of, and Job Costing Method of Cost Finding.)

OPERATIVE UNDERTAKING COSTING. Where services are rendered rather than goods produced, this method of cost finding will generally be used. A single measurement demonstrates the work performed, though it may vary in kind, as when a railway company reckons work performed as per passenger mile or per ton mile, etc., or an electric supply company per Board of Trade unit or kilowatt-hour.

Operative costs render possible the costing of transport undertaking and other public utility concerns, such as electricity supply, water, and, in some cases, sewage and gas companies, etc.

One of the outstanding features of operative costing is a comprehensive classification of all expenses. In the case of a tramway company, a distinction is first made between maintenance charges and those expenses which directly relate to the running costs ; also general administration, and each of these main groups is again analysed according to the size of the undertaking.

Maintenance charges, for instance, may be classified to show in the first place—

(*a*) Maintenance of permanent ways.
(*b*) Maintenance of overhead equipment.
(*c*) Maintenance of buildings.
(*d*) Maintenance and repairs of rolling stock.

Each of these main headings may be further analysed to show the amount expended on the respective kinds of assets as follows—

(*a*) Maintenance of permanent ways—
1. Ordinary maintenance
2. Renewals.

(*b*) Maintenance of overhead equipment—
1. Overhead equipment.
2. Cables.
3. Section boxes.
4. Sub-stations and plant.

(*c*) Maintenance of buildings—
1. Car sheds.
2. Repair shop.
3. Stores.
4. Offices.

(*d*) Repairs and maintenance of rolling stock—

1. Car bodies.	3. Axles and wheels.
2. Motors and controllers.	4. Lighting equipment.

The costing routine and the detailed work involved will not be so extensive as with the job or process methods of costing, as the operation of the method will be almost limited to the analysis of stores consumed and expenditure directly connected with the running of the cars, etc. Repair and maintenance work, however, may be dealt with on the job costing principles; and all time, materials, and direct expenses booked to each repair job, the total of such job costs being closed out to the respective maintenance accounts as above.

The analysis of wages other than those of the men engaged on repairs will be allocated direct by means of an analysed form of pay roll, suitable columns being included for such work as cleaning car and track, pointmen, drivers, conductors, inspectors, etc.

The collection and summarizing of the expenditure, either weekly or monthly, are a comparatively simple matter, if the classification of expenses has been effected in a methodical manner in accordance with the principles given under "Classification of Expenses," also "By-product Costing."

The following comparative statements clearly indicate the principles involved with this method of costing—

Form No. 54.

EXPENSE ALLOCATION

Generation.							Distribution.					
	Repairs and Maintenance of.							Repairs and Maintenance of.				
Generation.	Power-house Buildings.	Engines and Boilers.	Dynamos, Exciters, Transformers, Etc.	Other Machinery and Instruments.	Accumulators.	Total.	Inspection.	Cables.	Overhead Equipment.	Section Boxes.	Sub-stations and Plant.	Total.

ALLOCATION (Continued)

Buildings.	Permanent Way.				Cars and Car Equipments.							
Repairs and Maintenance of Offices, Car Sheds, Stores, and other Buildings, excluding Power-house Buildings.	Repairs and Maintenance.			Inspection.	Repairs and Maintenance.						Capital (as per details attached).	Aggregate
	Ordinary Maintenance.	Renewals.	Total.		Car Bodies.	Motors and Controllers.	Trucks and Gear.	Axles and Wheels.	Lighting Equipments.	Total.		

Form No. 55.

PAY ROLL

FOR THE ENDED....19..

						Allocation.					
No.	Name.	Grade.	Rate.	Amount.	Capital as per Allocation at foot.	Generation.	Distribution.	Operation.	Cars and Car Equipments.	Buildings.	Permanent Way.

Form No. 56.

COMPARATIVE SUMMARY OF INCOME AND EXPENDITURE

FOR ENDED....................19..

Income

Route.	For corresponding period of ended........					For ended........					Increase.					Decrease.				
	Receipts.	No. of Cars.	Car Miles.	No. of Passengers.	Receipts per Car Mile.	Receipts.	No. of Cars.	Car Miles.	No. of Passengers.	Receipts per Car Mile.	Receipts.	No. of Cars.	Car Miles.	No. of Passengers.	Receipts per Car Mile.	Receipts.	No. of Cars.	Car Miles.	No. of Passengers.	Receipts per Car Mile.
Traffic Receipts																				
Sundry ,, ...																				
Total for period																				
Brought forward from immediately preceding period ..																				
Total to date																				

Form No. 56 (*contd.*).

EXPENDITURE

Description.	For corresponding period of ended		For ended........		Increase.		Decrease.	
	Amount.	Per Car Mile.	Amount.	Per Car Mile.	Amount	Per Car Mile.	Amount.	Per Car Mile.
Operation								
Generation								
Distribution								
Buildings								
Permanent Way ..								
Cars and Car Equipment								
Administration and general								
Total for period ..								
Brought forward from immediately preceding period								
Total to date ..								

Form No. 57. DETAILED COST STATEMENTS AND STATISTICS FOR ENDED..............19..

Description.	Amount.	Total.	Per Car Mile.	
			This year.	Last year.
(*a*) Operation—				
Inspector's Wages				
Clerks' and Storekeepers' Wages				
Drivers' and Conductors' Wages				
Point Boys', Car and Track Cleaners', and other Wages				
Salaries				
Stores				
Water				
Light				
Sundries				
Total				
(*b*) Generation—				
Wages				
Salaries				
Fuel				
Oil, Waste, Water, and Engine-room Stores				
Repairs and Maintenance—				
Power Station Buildings—Wages				
Stores				
Engines and Boilers—Wages				
Stores				
Dynamos, Transformers, Motors, etc.—Wages ..				
Stores ..				
Other Machinery, Instruments, etc.— Wages ..				
Stores ..				
Accumulators— Wages ..				
Stores ..				
Sundries				
Total				
(*c*) Purchase or Energy— (Particulars.)				
Total				
Forward				

Form No. 57 (*contd.*).

Description.	Amount.	Total.	Per Car Mile.	
			This year.	Last year.
Forward				
Distribution—				
Wages				
Salaries				
Stores				
Repairs and Maintenance—				
Sub-stations and Plant— Wages				
Stores				
Overhead equipment— Wages				
Stores				
Cables and section boxes— Wages				
Stores				
Sundries				
Total				
Buildings (excluding Power Station)—				
Wages				
Salaries				
Stores				
Total				
Permanent Way—				
Salaries				
Ordinary Maintenance—Wages				
Stores				
Renewals— Wages				
Stores				
Total				
Forward				

Description.	Amount.	Total.	Per Car Mile.	
			This year.	Last year.
Forward				
Cars and Car Equipments—				
Wages				
Salaries				
Repairs and Maintenance—				
Car bodies—Wages				
Stores				
Motors and Controllers— Wages				
Stores				
Trucks and Gear— Wages				
Stores				
Axles and Wheels— Wages				
Stores				
Trolley Poles and Wheels— Wages				
Stores				
Lighting Equipments— Wages				
Stores				
Sundries				
Total				
Administration Charges—(chief office) (Particulars.)				
Total				
Aggregate for period				

Form No. 57 (*contd.*).

	Description.	This Year.	Last Year.
1.	Route mileage of Wires operated		
2.	Number of Car Miles run		
3.	,, Hours		
4.	,, Service Hours		
5.	Receipts per Car Mile		
6.	,, ,, Car per day		
7.	,, ,, Route Mile		
8.	,, ,, Messenger		
9.	Expenditure per Route Mile		
10.	,, ,, Car Mile		
11.	,, ,, Passenger		
12.	Units generated and/or purchased		
13.	,, sent out from Station		
14.	,, used in Offices and Works		
15.	,, used in Street Lighting		
16.	,, sent out to Cars		
17.	,, per Car Mile		
18.	,, maximum demand (k.w.) of traction load		
19.	,, per Mile		
20.	No. of Car Miles per hour, *i.e.* $\frac{\text{Car Miles}}{\text{Car Hours}}$		
21.	Lost Mileage		

No. of Passengers carried at each Fare.	This Year.	Last Year.
½		
1		
1½		
2		
3		

ORDER METHOD OF COST FINDING. (See JOB COSTING METHOD OF COST FINDING, also COST FINDING—METHODS OF.)

OUTPUT—BASING EXPENSES ON MINIMUM, MAXIMUM, NORMAL OR REDUCED. (See ESTABLISHMENT EXPENSES.)

OUTPUT BONUS. (See BONUS ON OUTPUT.)

OUTPUT COSTING. (See SINGLE OR OUTPUT COSTING, also COST FINDING—METHODS OF.)

OUTPUT STANDARDS. (See STANDARD COSTING.)

OUTWORKER'S TIME SHEET. The nature of some industries is such that employees are sent away from the factory to work upon a customer's site, and in these cases an outworker's time sheet, ruled similar to the specimen given, will be used. The use of an outworker's time sheet is necessary when the work to be done on the customer's site is of short duration, and where only a few men are required, but with large contracts, extending over a long period of time and requiring a large number of men, it will then be desirable to install time recorders on the site and for the men to use clock

Form No. 58 (*Front*).

OUT WORKER'S TIME SHEET

No. ....

Name.. Rate.........................

W.O. No................ Week Ending..

Particulars of Work...

....

....

	On.	Off.	Foreman's Signature.	Ordinary Time.	Over-time.
FRIDAY . .					
SATURDAY . .					
SUNDAY . .					
MONDAY . .					
TUESDAY . .					
WEDNESDAY .					
THURSDAY .					
TOTAL FOR WEEK . . .					

	Hours.	Rate.	£	s.	d.
ORDINARY TIME .					
OVERTIME . .					
EXTRAS PER OTHER SIDE . . .					
DEDUCTIONS— Health................ Unempyt.					
TOTAL . . . . £					

Form No. 58 (*Back*).

OUT WORK EXPENSES SHEET

Job.. W/O..............................

Week Ending..192.................

	£	*s.*	*d.*
Railway Fares from			
to			
....			
Out Door Allowance.......................................			
....			
Stamps, Telegrams, etc.			
Extras (if any) to be stated in detail and Receipt for same attached			
....			
....			
....			
....			
....			
....			
....			
....			
Signature..			

cards as would be done in the case of a worker engaged in the factory.

When outworkers' time sheets are used, they will be sent to the Wages Department of the factory at the end of each week and dealt with there in a similar manner as the gate cards, excepting that in this instance the workers may be paid on the site instead of at the factory.

In the case of a large contract being carried out which will extend over a long period of time, a time clerk is usually stationed on the site to supervise the recording of time. In these instances the time clerk will calculate the times and amount of pay, etc., and prepare a statement of the total wages required, which is sent to the factory. The amounts will then be made up and placed in their respective envelopes or pay boxes, and the workmen paid on the site. The back of the outworker's time sheet may be ruled to accommodate a statement of the travelling and incidental expense incurred by each worker.

OVERDRAFTS—EXPENSES OF. (See Bank Overdraft.)

OVERHEAD EXPENSES. (See Establishment Expenses.)

PARAMOUNT SORTING SYSTEM. The Paramount sorting system is a simple and most inexpensive method of sorting and classifying all forms of data, from small job tickets, time cards, and stores requisitions to the comprehensive analysis cards essential to the present-day methods of scientific management. Whilst the method is worked on the punched card principle, it differs considerably from the "Powers" and "Hollerith" systems—

1. The cards are provided with a series of holes perforated adjacent to the edges, each hole representing a definite value in the group allotted to a certain classification. The holes vary in number according to the number of classifications into which it is desired to assemble the cards, and the particular hole or holes, corresponding to the information to be indicated, is slotted away to the edge of the card, this slotting being equivalent to the punching of holes in the body of a card by the "Hollerith" or "Power" system.

2. No machinery for sorting is necessary, as this operation is carried out by hand, and at more than twice the speed of machine sorting.

Paramount sorting is effected by taking a stack of cards which have been slotted into various classifications, and passing a stiff wire, such as a knitting needle, through the holes in the cards, corresponding to the classification (Fig. 1), and

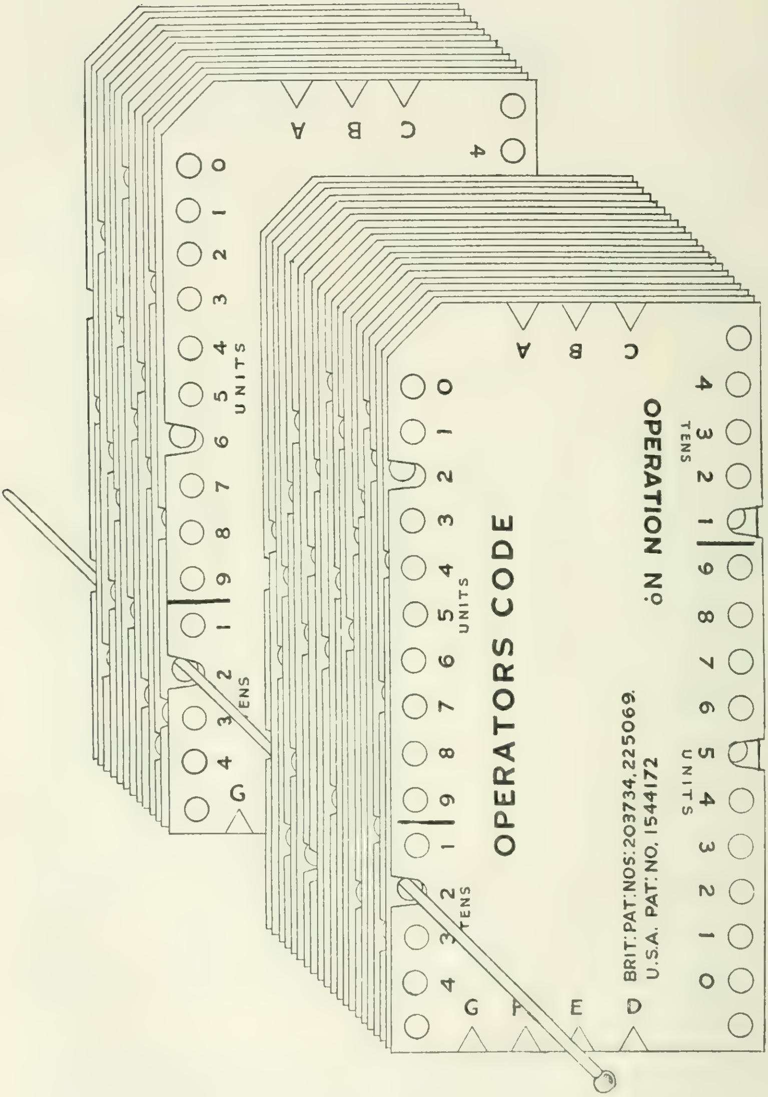

OPERATORS CODE
OPERATION No
BRIT: PAT: NOS: 203734, 225069.
U.S.A. PAT: NO. 1544172
UNITS
TENS
A
B
C
D
E
F
G
0 1 2 3 4 5 6 7 8 9
1 2 3 4

Fig. 1.

raising the wire ; those cards in this classification having nothing to support them, fall clear of the remainder. This is a very rapid process, as a large number of cards fall together ; the cards being sorted at the rate of 60,000 per hour.

3. The system provides an absolute and visible check on the accuracy of sorting—when cards of a given classification have been separated from the remainder, and are tapped into alignment with each other, the slotted holes show up as grooves cut along the edge of the stack, as shown in the illustration (Fig. 2) above. Any card of a different classification which may accidentally have got into the stack is therefore immediately disclosed by breaking the line of the groove—thus providing the visible check.

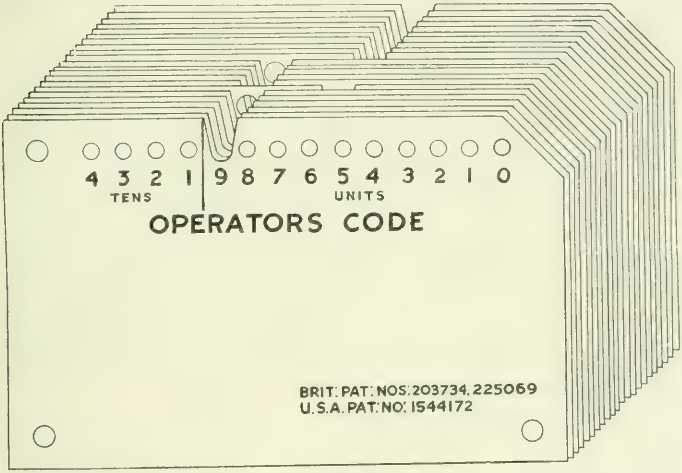


Fig. 2.

4. When cards are filed away in numerical sequence or code order, the slottings which show up as grooves automatically provide a visible index, as will be seen on reference to Fig. 2—guide cards being unnecessary, as the position of the grooves indicate the separate divisions.

5. No special tabulating machinery is required for summarizing or tabulating the results, as this can be done either by hand or with the aid of any existing adding or listing machine.

6. There is no restriction as to the size or shape of the forms

that can be used with this method, or even the quality or class of material from which they are made; for instance, cards as small as railway tickets or sheets of paper—size 10 in. by 8 in. and over can be used: furthermore, the system can be utilized for the sorting of metal or fibre pay and time checks, etc.

The slotting of the cards or forms may be done in various ways, the simplest form being the ticket nipper, similar to those used by railway ticket inspectors, or letter perforators, which can be set to cut out definite codes of one or more figures, and are suitable to issue to workers for the purpose of slotting their identity codes in piecework or job tickets. Where the cards have to be slotted in large quantities, and can be brought to a central point, it is preferable to have a multiple key punch. By this means cards may be slotted into six or seven classifications at a speed of 1,200 per hour.

When the system is used in connection with time cards, job cards, or piecework tickets, it is in many instances possible to slot the cards with the workers' codes before they are issued to the workers. For this purpose a simple form of grooving machine—namely, a single knife driven by a foot or hand lever, can be used to groove 200 cards at a time. This machine is capable of slotting 110,000 cards per hour with single figure codes.

In certain instances the holes or perforations may be slightly nicked towards the edge of the card, and in such cases the slotting is then effected by placing the point of a pencil in the hole and pulling away the nicked portion of the card, thus opening out the hole for the purpose of sorting.

The Paramount method of sorting requires the use of codes for each classification, and the material which has to be sorted and tabulated can be coded by either of the following arrangements—

1. By allotting a series of 10 holes for the units, tens, hundreds, thousands, until the desired limit is reached: each series bearing the numbers 0 to 9 under the respective holes. If the size of the card or form to be sorted will not permit of this arrangement, the following may be used—

2. A series of six holes, numbered 0 to 5 inclusive, are allotted for the units, tens, etc., the numbers 1 to 5 being indicated by single slotting, and the numbers over 5 by double slotting; for instance, the holes 5 and 1 both slotted out indicate 6: likewise 5 and 2 = 7, and so on. This does not involve extra labour in sorting, as by passing the needle

through the 5 hole in the first instance, the stack is automatically divided into numbers over 5, and 5 and below.

3. Another variation of the above is to have six holes, five of which are numbered 1, 3, 5, 7, 9, the sixth being lettered X. A slotted hole being normally read as the odd figure printed below it, but when the X hole is also slotted the hole is read as the even figure next below: e.g. X9 = 8, X1 = 0.

4. By having a series of 12 holes, 10 of which are numbered 0 to 9, and two lettered N and R/D, to denote the order of reading, as follows—

○	○	○	○	○	○	○	○	○	○	○	○
9	8	7	6	5	4	3	2	1	0	N	R/D.

a complete range of numbers from 0 to 99 is possible.

"N" indicates normal reading.

"R/D" denotes—in the case of double slottings "read from right to left," and in the case of single slottings "read as though the figure has been written twice"—see following examples.

A single hole slotted in conjunction with the "N" will, therefore, be read as the figure printed below normally indicates; if, however, the "R/D" hole is slotted then the figure will be read twice, e.g. 5 R/D = 55.

Double figures slotted in conjunction with the "N" hole should be read from left to right as written figures thus, 8, 5, N = 85; on the other hand, if the "R/D" hole is slotted in place of the "N," the 8 and 5 would be read in the reverse way (right to left), viz., 58.

This can be extended to a second series of 12 holes, making 24 in all, covering hundreds and thousands, which then gives a complete numerical sequence from 0 to 9999.

If the codes need not be kept in strict numerical sequence as identity codes for workers, articles, or for any other purpose which does not necessitate codes running in consecutive order, *with* 10 *holes* the following codes may be used—

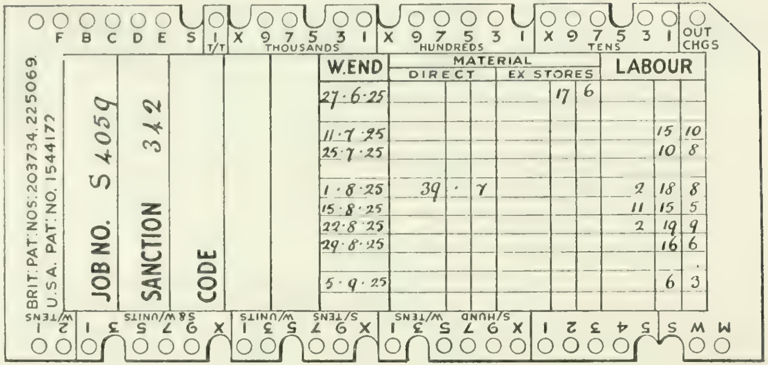
Single Figure Code. By slotting each hole out individually 0 to 9—a code with a series of 10 index figures is provided.

2-Figure Code. By reading the left-hand hole of the two slotted away as the ten and the right-hand hole as the unit—a code of 45 figures may be used, e.g. 10, 20, 21, 30, 31, 32, 40, etc.

3-Figure Code. Reading in the same manner from the left-hand hole as the hundred, the middle hole as the ten, and the right-hand hole as the unit—a code consisting of 120 figures is available—e.g. 210, 310, 320, 321, 410, etc.

Form No. 59.

JOB COST SUMMARY CARD:



F B C D E S | 1 T/T | X 9 7 5 3 1 THOUSANDS | X 9 7 5 3 1 HUNDREDS | X 9 7 5 3 1 TENS | OUT CHGS

BRIT: PAT: NOS: 203734. 225069.
U.S.A. PAT: NO. 1544172

JOB NO. S 4059

SANCTION 342

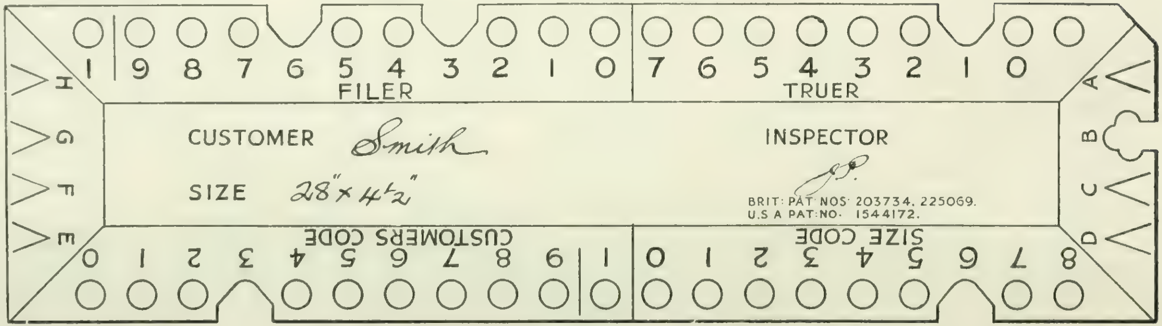
CODE

W.END	MATERIAL						LABOUR		
	DIRECT			EX STORES					
27·6·25					17	6			
11·7·25								15	10
25·7·25								10	8
1·8·25	39	·	7				2	18	8
15·8·25							11	15	5
22·8·25							2	19	9
29·8·25								16	6
5·9·25								6	3

2 1 W/TENS | X 9 7 5 3 1 S&W/UNITS | X 9 7 5 3 1 S/TENS W/UNITS | X 9 7 5 3 1 S/HUND W/TENS | 5 4 3 2 1 | M W S

Form No. 60.

OPERATION COST CARD.



1 | 9 8 7 6 5 4 3 2 1 0 FILER | 7 6 5 4 3 2 1 0 TRUER

A B C D

H G F E

CUSTOMER Smith

SIZE 28"×4½"

INSPECTOR

BRIT: PAT: NOS: 203734. 225069.
U.S A PAT: NO. 1544172.

0 1 2 3 4 5 6 7 8 9 | 1 CUSTOMERS CODE | 0 1 2 3 4 5 6 7 8 SIZE CODE

4-Figure Code. In the same manner a code of 210 figures is possible, e.g. 3210, 4210, 4310, 4320, 4321, and so on.

If a still larger range is required the above figures may be squared by using a double code, making 20 holes in all, e.g.—

A single-figure code in two series 0/0 to 9/9 gives a code of 100 index figures.

By extending the code to two *figures* in the two series from 0/0 to 98/98, we get 3,025 index figures.

By using three *figures* in two series it is possible to obtain 30,625 index figures.

Four *figures* in two series will give 148,225 index figures.

The " Paramount " method is applicable to all classes of clerical work requiring the collection of details into classified form. The work of sorting time cards, job cards, stores requisitions, work tickets, is reduced to a minimum, and by re-sorting into different classifications the laborious process of hand analysis, with its consequent checking, is eliminated.

The procedure followed with regard to the sorting and analysing is very simple, as will be observed from the description which follows of a Costing System used in a large machine shop.

Each works order is given a serial job number, which is entered on a card similar to the specimen given (Form 59), together with the sanction number or departmental code number to which the job is chargeable. These numbers are then slotted along the top and bottom edges of the card, together with certain other information such as date of order and class of work, which is expressed by the code F B C D E S in top left-hand corner ; F B C representing orders received during the years 1924, 1925, and 1926 ; and D E S which relates to orders on the pattern shop, experimental orders, and capital expenditure respectively. The card illustrated relates to job number S 4059, and this reference number is slotted with the " S," indicating that it is a sanction order covering capital expenditure, together with 405 on the principle referred to in number 3 example of coding, and described on page 215, the unit figure of 9 in the job number S 4059 is not provided for, it being unnecessary to carry the sorting by mechanical method beyond the tens.

With regard to the holes along the bottom edge of the card. These refer to " M "—work done for a branch factory ; " W " works or departmental order ; " S " sanction order ; 5, 4, and 3, additions, replacements, and alterations to plant respectively. 2 miscellaneous, and 1 general sanctions, the remainder of the bottom edge being reserved for code numbers also arranged on the principle set out in the paragraph numbered 3 on page 215, but in this instance the slottings are read as hundreds, tens, and units, in connection with sanction orders, or as tens and units plus tens and units for the two series of numbers which constitute the works code.

It will be seen that in order to arrange the holes in series suitable for both codes that the 2 holes reserved for the tens in the second series of the works code have been placed to the right of the units.

In the case illustrated the " S " has been slotted out to represent sanction order, 5 to denote that the order covers an addition to plant ; the 3, X5, X3 to denote sanction number 342.

The value of the materials used on all orders are obtained from the stores requisitions, and the amounts posted each week ; likewise the labour expended is posted from the job cards, and the value of the labour balanced with the pay roll weekly.

The costs have now to be analysed according to chargeable codes for the purpose of debiting the Work in Progress Account of each department, with the amount of labour expended and material used during the week in question. This is effected by sorting the cards into chargeable code order, when the items will be automatically assembled ready for totalling, after which the cards are re-sorted into job number order for subsequent postings.

Under the old method this analysis was done by hand ; the stores requisitions and time cards being posted to individual job numbers, and an abstract prepared by the use of analysis paper.

The method of sorting is as follows—

The cards are first tapped lightly into alignment and a stiff wire is passed through the " S " hole to divide the cards into sanctions and departmental orders ; on raising the wire, all those slotted away at this hole fall clear, and the remainder are carried away on the wire. If the two stacks are now tapped into alignment there will be an unbroken groove running through each stack at the " W " and " S " holes respectively ; thus proving that the cards have been accurately sorted into their respective classifications, viz., works code and sanctions.

Each stack is then sorted into numerical order, starting with the X hole in the hundreds, thus dividing the stack into odd and even hundreds, as already described; the cards are then sorted into the respective hundreds by passing the wire first through the 9 hole and then through the 7 hole, and so on through each of the stacks; the process being repeated through the tens and units, by which time the cards will be arranged in correct numerical order of sanction numbers and works codes.

The above description chiefly shows how the work of analysing the details into classifications is simplified; the card in this instance is made out in the cost office, and does not leave this department.

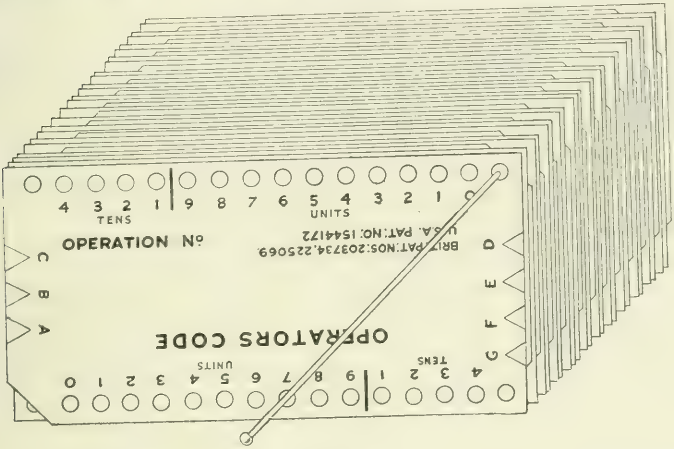


FIG. 3.

There has yet to be described the internal routine of the factory, in so far as it relates to the costing system, and in this direction the ticket is usually a form that is very easily adapted to any existing costing system in connection with repetition work. The form illustrated (Form 60) is a job ticket used by a large manufacturing firm. It covers two repetition operations, and forms the basis for calculating piecework earnings, and compiling of job costs and progress reports.

The filers' codes are slotted in advance on the tickets and issued in bulk. Upon completion of each unit of work, the filers pass the work, together with a ticket to the next operation, viz., truing. The truer, after completing his work, slots his code in the ticket, and passes it on with the work to the inspector. After passing the work, the inspector clips the ticket through his letter code with a special design of ticket nipper, which does not leave his possession, and drops the ticket into a box, the box being cleared periodically throughout the day by the departmental clerk.

The tickets are first checked to see that all have been clipped by the inspector, any not so clipped being rejected. They are then sorted into size and customers' code order, and the progress record written up. The tickets are then sorted into operators' code order, and the number of pieces credited to the workers; the total of pieces and value forming the basis for costing each job or process.

Corner Sorting. In practice the cards or forms may occasionally be received into the office in such disorder or disarrangement that they have first to be placed in correct position or relation to each other for sorting.

For example, the tallies may arrive at the office some with the fronts turned round the wrong way; others turned top downwards, and so on. There are four possible positions, but the arranging of cards into their correct position is speedily accomplished in the following manner—

One corner of each card is cut away, and at each of the other three corners is provided a hole. It will, therefore, be seen that by tapping the cards into alignment all those cards which are not correctly positioned will project beyond the cut away corner of the correctly positioned cards, as shown in Fig. 3. By passing the sorting wire through the corner hole in the projecting cards, such cards are taken away on the wire, and the correctly positioned ones left behind. By repeating this process through the remaining corners the cards are very speedily brought into the correct arrangement for sorting.

PARCELS POST. (See POSTAGES.)

PATENT FEES. The expenses relating to patent fees and renewals form part of the establishment expenses of the business, and are allocated to administrative expenses. In many instances this expense item is allocated direct to the Factory Expense Account, but such procedure is not correct, as the charges incurred in connection with patenting a company's products are essentially an administrative expense, and not a direct charge to the Factory or Sales Department.

PATTERNS—RECORD OF. In many industries, particularly in the case of foundries, engineering concerns, etc., patterns, moulds, dies, etc., constitute an important item among the assets, and a complete record of these articles should be maintained in a similar manner as for machine tools, etc.

Form No. 61 (*Front*).

PATTERN RECORD TITLE		Drg. No.	Patt. No.
No. Core Boxes Parts	No. Parts in Patt.	Wood Metal	Bin

FOUNDRY.	Casting Material.	Pattern Issued.	Pattern Retnd.

Size 8″ *by* 5″

Form No. 61 (*Back*)

FOUNDRY.	Casting Material.	Pattern Issued.	Pattern Retnd.

ALTERATIONS.

Date.	No.	Date.	No.	Date.	No.

Depreciation charges are usually heavy, as also the cost of repairs. Patterns, therefore, should be classified on the same principle as plant, and depreciation rates established for each class.

A card similar to the plant record card is used for recording values, etc. In cases where patterns and dies are sent to outside foundries, etc., an additional record is necessary, so that a complete record of the location of each pattern is obtained. A record card for this purpose is given on page 221, which is self-explanatory.

PAY ROLL. The primary object of a pay roll is, firstly, to provide a medium for summarizing the amount of wages payable to each worker in order that a "total" can be obtained; and, secondly, to form a permanent record of all wages paid each week.

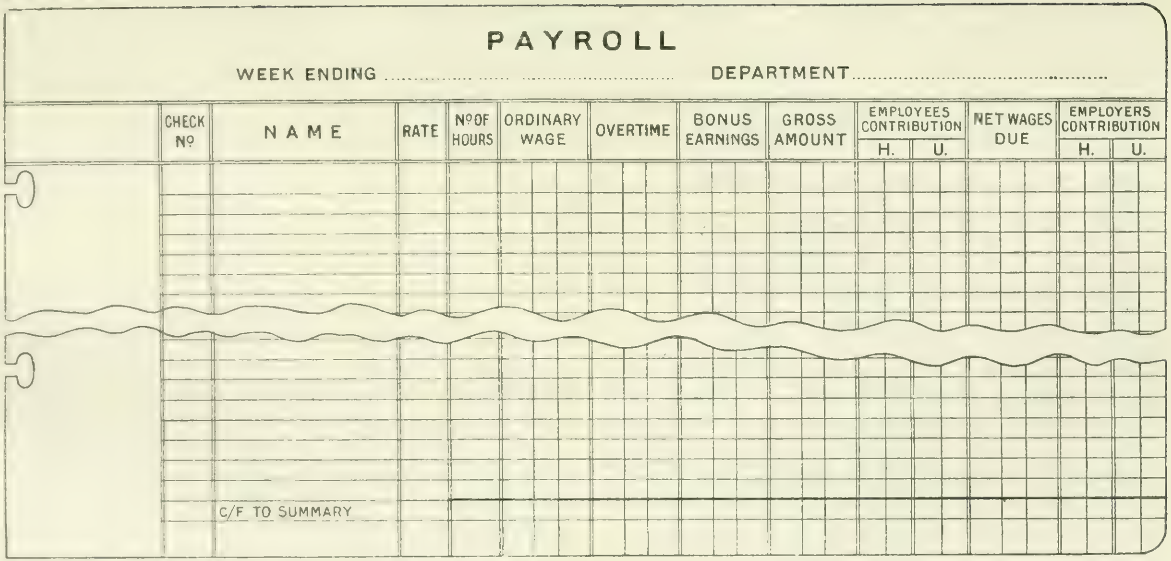
The pay roll, however, can be arranged to provide useful statistics in addition to the above; for instance, the nature of some industries is such that the total wages can be analysed to show the amount per article or the total paid to direct and indirect workers, whereas in the process industries, the analysis may be arranged to give the wages paid for each process and service department.

The illustration given is a pay roll which has been designed for use on the loose-leaf principle, and can be arranged to give either a departmental or process analysis as well as the wages paid to each service department. When this form of pay roll is used, a separate sheet will be required for each department or process, and the total of each summarized on a separate sheet.

From this summary numerous statistics can be compiled; for instance, the average number of hours per worker is obtained by adding the hours in the "number of hours" column and dividing the total by the number of workers on the pay roll, such a figure being calculated per department or process, etc., according to the information desired. The average earnings per worker can also be ascertained by dividing the total wages by the number of workers. This average figure can be calculated either for ordinary wages, overtime, bonus earnings or gross or net amount of wages paid.

With those concerns which employ a large number of youths and apprentices, etc., it is desirable to use a separate sheet for each class of worker if the above or similar average figures are to be calculated.

Form No. 62.



PAYROLL

WEEK ENDING ……………………………… DEPARTMENT ………………………………

	CHECK Nº	NAME	RATE	Nº OF HOURS	ORDINARY WAGE	OVERTIME	BONUS EARNINGS	GROSS AMOUNT	EMPLOYEES CONTRIBUTION		NET WAGES DUE	EMPLOYERS CONTRIBUTION	
									H.	U.		H.	U.
		C/F TO SUMMARY											

The choice of any ruling of pay roll will naturally depend upon the amount of information required from this record, and also the extent to which the wages are analysed by the system of service orders. For instance, if the pay roll cannot conveniently be arranged to give the desired analysis, it will then be necessary to obtain this analysis by means of a system of service orders. In such cases it is then usual for the pay roll to give a more or less general analysis of direct or indirect wages, departmental or process, etc. (See also illustration of pay roll on pages 47 and 260.)

PERCENTAGE ON DIRECT LABOUR METHOD OF RECOVERING EXPENSES. The computation and recovery of expenses on the basis of direct labour value is perhaps the most common method used, and its popularity is no doubt due to its extreme simplicity. With this method the expensee are recovered as a percentage on the direct labour cost of each article, order, or process, and the calculations necessary to arrive at the percentage rate to be used may be expressed by the following formula—

$$\frac{\text{Estimated total factory expenses for the period} \times 100}{\text{Estimated total direct labour for period}}$$

The principles involved in estimating the total expenses for the year are fully dealt with under the general consideration of establishment expenses.

The predetermination of the total direct wages for the year or other period is based upon the normal maximum output of the factory, and a close estimate can only be arrived at when all the factors which enter into the estimate are dealt with individually and upon a scientific basis.

1. **Estimating Output.** The normal maximum output is the total output that should be obtained, assuming that the factory will be working full ordinary time throughout the period and at a reasonable rate of efficiency. The estimate in the first place will require that the plant be examined and a standard rate of output fixed for each department, process or group of machines on this basis. This examination of the plant, etc., may not be necessary in all cases, as most factories will have been correctly departmentalized, but in those instances where a factory is not well organized, it will necessitate that each operation or class of work be listed together with the number of machine tools, etc., available in each group, and the possible output capacity ascertained in consultation with the works manager or production engineer.

2. Estimating Number of Direct Workers. The lists prepared in connection with 1 above should be arranged in order of department, operation or process, so that the next step, which is to estimate the number of direct workers necessary to give the required output or to "man" the respective machine tools, can be dealt with as a natural sequence to the figures obtained from 1 above.

3. Estimated Wages of Direct Workers. The lists being arranged in order of departments or operations, they will automatically give the trades of the respective workers, and the estimate of the total direct wages can now be completed. The average weekly pay for direct workers engaged in the respective trades is easily ascertained from the pay roll, if ruled similar to the specimen given on page 223, and the final estimated figure is now obtained by multiplying the number of workers as ascertained under 2 above by the average weekly pay for the normal working week.

When estimating the number of working days in a costing period, due allowance should be made for holidays and time lost for various reasons. The general practice in this direction is to regard a year as 50 weeks of 5½ working days each, less an allowance for lost time.

The time lost for various reasons should be obtainable from the pay roll or other record, and expressed as a percentage rate on the total possible number of hours.

It will be seen from the above that the correctness of the percentage rate which is finally arrived at will depend upon three factors, namely—

1. The estimate of the factory expenses for the ensuing period;
2. The estimate of the quantity of goods that will be made and their factory cost;
3. The estimate of the amount of direct wages;

and unless these estimates are prepared scientifically, serious errors may occur. In some instances, however, the expenses and direct labour of the previous year are taken as a basis for the ensuing period, but this method cannot be seriously recommended.

Assuming that from the estimates prepared as above the total factory expense is £151,050, and that direct labour amounts to £159,000, the expense rate would therefore be—

$$\frac{£151{,}050 \times 100}{£159{,}000} = 95\%$$

The amount of factory expenses to be recovered on each job would, therefore, be ascertained by adding a figure which would be equal to 95 per cent of the direct labour as follows—

	£	s.	d.
Direct Labour	107	–	–
Direct Materials	123	–	–
Prime Cost . . .	230	–	–
Factory Expenses— 95% on Direct Labour . .	101	15	–
TOTAL FACTORY COST .	£331	15	–

This method is extremely simple to operate and if all the workmen are paid a uniform rate and if they all work under similar physical conditions, it will give fairly accurate results, as the workers' earnings are the basis of calculation, and not the time taken or equipment used to complete the work when machinery and equipment are used.

One of the main objections to the method is that no allowance is made for a job which requires the use of expensive machinery, or for a job which may be all hand work. This is a serious fault, because the article or process which requires the use of machinery should have charged to it a greater proportion of the factory expenses than one which requires the use of little or no machinery.

A further objection to this method is that no allowance is made for the time taken to complete a job, as the following examples will show—

Assume a department where all bench work is carried out, and that the workers are paid by the piece work method. Two men are each given a job, the piece work price being 25s. for the job in each case. If worker No. 1 completes his task in 10 hours and worker No. 2 in 15 hours, the amount of factory expense to be added to the cost will be the same for both jobs, despite the fact that worker No. 2 made use of his bench, tools, and supervision, etc., for a longer period than worker No. 1. However, had these men been paid by the day rate system, a difference in cost would be shown in each case—

WORKER NO. 1. TIME TAKEN, 10 HOURS

Piece Work Method.	£	s.	d.	*Day Rate Method.*	£	s.	d.
Materials . . .	1	10	–	Materials . . .	1	10	–
Direct Labour . .	1	5		Direct Labour at 2/6 per hour . .	1	5	
Factory Expenses (say 100%) . . .	1	5	–	Factory Expenses 100% . . .	1	5	–
	£4	–	–		£4	–	–

Worker No. 2. Time Taken, 15 Hours

	£ s. d.		£ s. d.
Materials . . .	1 10 –	Materials . . .	1 10 –
Direct Labour . .	1 5 –	Direct Labour at 2/6 per hour . .	1 17 6
Factory Expenses—100% . . .	1 5 –	Factory Expenses—100% . . .	1 17 6
	£4 – –		£5 5 –

The above examples clearly illustrate that the results obtained from this method are very inconsistent.

As a further illustration, the manufacture of paint offers a very good example. In a certain process the quantity of raw materials used is absolutely fixed, and any variation of the purchase price on the materials is easily computed. The workmen in charge of the machines regularly produce 12 cwt. per hour and are paid on a piece work basis. The direct labour cost amounting to 5s. per cwt., factory expenses are fairly heavy at 150 per cent on direct labour. The cost may, therefore, be stated as follows—

	Per Cwt. £ s. d.
Materials	1 17 6
Labour	5 –
Factory Expenses	7 6
	£2 10 –

A time study was made and it was found possible to reduce the running time per machine by 20 per cent. Under these new working conditions the raw materials and direct labour were as before, but, owing to the fact that less time is now taken, the factory expenses are reduced by about 1s. 6d. per cwt. If expenses are recovered as a percentage on direct labour, no alteration in the cost of this particular process will be shown, in spite of the fact that the output is increased by reducing the time taken for the operation.

The basis of the percentage on direct labour method being a worker's earnings, and not the time taken or equipment used, reduces its value considerably, because accurate results are only obtainable under very exceptional circumstances. Uniformity of pay and working conditions rarely exist throughout any one factory and the method should, therefore, only be used for those departments of a factory where the special conditions justify its adoption.

The examples given above clearly illustrate that the special conditions of each factory will require the most careful consideration before any particular method or methods can be finally selected.

PERCENTAGE ON PRIME COST METHOD OF RECOVERING EXPENSES. The method of computing and recovering expenses on the basis of *prime cost* is very similar to the percentage on direct labour method, excepting that the expenses are calculated on the total direct labour and direct material costs of each job, operation or process, instead of on the amount of direct labour only.

The calculations necessary to arrive at a percentage rate may be expressed by the following formula—

$$\frac{\text{Total factory expense} \times 100}{(\text{Total direct labour} + \text{Total direct materials})}$$

The accuracy of the prime cost method depends upon the correctness of the percentage rate established, and the rate may sometimes be calculated upon the actual expenses and costs of previous years, or an estimate prepared either upon a reduced output or the full normal output capacity of the factory. The advantages and disadvantages of each of these methods of estimating expenses are dealt with under the heading of "estimating expenses," also "establishment expenses."

As an example, if the total factory expenses over a period were estimated to be £85,200, and the total direct labour used and direct materials consumed in production were £69,300 and £72,700 respectively, the percentage to be used for recovering expenses in costs would be—

$$\frac{£85{,}200 \times 100}{£69{,}300 + £72{,}700} = 60\%$$

The amount of expense to be recovered on each cost would, therefore, be ascertained by adding a figure which will be equal to 60 per cent of the prime cost, as follows—

	£	s.	d.
Direct Labour	98	–	–
Direct Materials	95	15	–
	193	15	–
Expenses (60%)	116	5	–
TOTAL COST . .	£310	–	–

With small manufacturing concerns the prime cost method is often used owing to its simplicity, but in the majority of cases the percentage rate is fixed more by business custom, consequently the amount added to prime cost depends largely upon what figure a competitor is using in the same line of business when arriving at a selling price rather than upon the actual facts.

In those cases, however, where a standard article is made and the labour and material costs are constant, and the process of manufacture is such that an equal value of the materials enters into the article at each stage or department, the method may be used with a fair amount of success. With those concerns making a variety of articles, however, and where certain of these articles only pass through a few departments, whilst the remainder must proceed through all processes of manufacture, the resultant costs will be very inaccurate, as no allowance will be made for the time taken to complete each process or article, or for those departments that use machinery and those which do not.

This method can seldom be applied on a departmental basis, because the value of materials used by each department will rarely form an equal part of the cost of every department through which the product passes ; furthermore, the costs of a department may only comprise labour and expenses, and in such a case the prime cost method could not be adopted.

It will, therefore, be seen that this is perhaps one of the most inaccurate methods, because expenses rarely, if ever, have any direct relation to the value of materials used, and possesses in addition to the above faults all the disadvantages which attach to the percentage on direct labour method.

PERCENTAGE ON SALES VALUE METHOD OF RECOVERING SELLING EXPENSES. (See SELLING AND DISTRIBUTION EXPENSES.)

PERCENTAGE ON WORKS COST METHOD OF RECOVERING SELLING EXPENSES. (See SELLING AND DISTRIBUTION EXPENSES.)

PERPETUAL INVENTORIES. (See STORES—FINANCIAL CONTROL, STOCK RECORD CARD, also RECORD OF BIN INSPECTION.)

PIECE RATE. (See PIECE WORK—METHOD OF REMUNERATING LABOUR.)

PIECE WORK EARNINGS—RECORD OF. The piece work earnings of employees are usually recorded in such a manner that any abnormal earnings on the part of individual workers in respect to identical operations can be notified to the Planning, Progress or other Departments. The reporting of abnormal piece work earnings is important, as it enables the departments concerned to investigate such items with a view to taking the necessary steps for the rectification of any errors that may have been made in the fixing of the original times and rates, etc.

The ruling of such forms will be very similar to the illustration given in connection with the record of premium or bonus earnings, excepting that the headings of the various columns will be arranged to suit the piece work method of payment. For instance, it may be necessary to show the number of pieces that should be completed within the stipulated time, the actual quantity finished, and the piece work rates.

In addition to the above, suitable space should be provided for noting any changes made either in regard to the time allowed, number of pieces or rates, or method of manufacture, in order that a complete history is obtained. Separate cards may be allocated to each article or component or to each operation, according to requirements.

The information posted to this record is obtained from the respective job cards or piece work tickets.

PIECE WORK—METHOD OF REMUNERATING LABOUR (also known as **Piece Rate, Straight Piece Rate**). The essential difference between this method and payment by time is that here there is a bargain between the employer and the worker that in return for a specified payment the worker will perform a definite quantity of work. He is not paid for his idle time, unless he is idle because of shortcomings on the part of the management, such as non-provision of the necessary material for carrying out the worker's part of the bargain, or no work ready for him to do. The worker is expected to conform to the usual works routine and regulations, but there does not appear to be a legal right on the part of the employer to fine him for tardiness or absence. The piece rate does take into consideration varying standards of accomplishments, the industrious worker being rewarded in exact ratio to his increased effort. There is also a distinct tendency to increased output because of the incentive now offered. The employer benefits by a decreased cost, his expenses being distributed over a greater output, resulting in a lower unit cost. Again, there is an improvement in quality, as the worker being paid only for that work which passes inspection, he is more careful in his scrutiny of the materials supplied to him, enabling faulty material to be rejected at an earlier stage. In his desire to increase his output, the worker frequently devises quicker and better methods of carrying out the process upon which he is engaged. Where piece rates are in force, the manufacturer is in a happy position in knowing his labour cost, and thereby in a better position than under the time rate in making quotations for contract. One other advantage is that once again we have a simple method for computation.

As a set-off against the foregoing advantages, there may be stated two serious difficulties which are inter-related—they are the questions of rate setting and what is known as "cutting." It will be convenient to deal with these simultaneously. One of the gravest criticisms that can be levelled against this method of remunerating labour, as usually employed, concerns the fixing of a just and equitable rate.

The usual method of fixing a rate has been to turn up past records, and to find something as nearly as possible the same as the process to be rated, and then frankly to guess at what it is considered the worker will accept. For new work which is outside the experience of the employers or their rate fixers, the guess is an absolute leap in the dark. It can readily be imagined that in these circumstances the chances are even that the rate will be too high or too low. Where the rate is too high, the workman makes so much money as to startle the employer, who has the feeling that there is an upper limit to a worker's earnings. At this point comes the "cut," that is the piece rate is reduced. The worker sets out at the new rate, again based on little or no information, and by dint of hard work or, perhaps, through having discovered a quicker method of performing the operation, once more makes high wages. Yet again the cut, and so on *ad nauseam*. There comes a point when the worker realizes that no matter how hard he may work, or how inventive he may have been, it is not intended to allow him to earn more than time and a quarter or at the very outside time and a half. The inevitable consequence follows that, no matter what piece rates are set, workers spin out their time and never attempt to earn more than time and a quarter or time and a half.

The fault lies entirely with the rate setting, a discussion on which will be found under that heading.

There is one other circumstance in which piece rates are unfair to workers, who often suffer through no fault of theirs. Material may be faulty, machinery in bad condition, or poor management may cause long delays and stoppages. It is evident that if an employer accepts the principle of piece rates, it is his duty to see that there is no waiting for material, that his organization is effective, eliminating all delays, and that all tools and equipment are maintained in the best possible condition.

Given these conditions and with rates scientifically, accurately, and justly set, the straight piece rate would be an excellent system in those industries where the nature of the products made justifies its adoption. (See also REMUNERATION OF LABOUR—METHODS OF.)

PLANT. The term "plant," also "plant and machinery," is very often used when referring to the various assets of a concern other than tools and buildings. The plant assets will, therefore, comprise producing machinery, i.e. machine tools which are permanently fixed in position as distinct from bench tools, etc., also power plant, heating plant, and other forms of special plant such as case hardening plant, drying ovens, smithy, compressed air plant, etc.

With most concerns a distinction is necessary between plant and machinery, and that given above will be found suitable for the majority of factories.

For a classification of both plant and machinery items, see SERVICE ORDERS.

PLANT ADDITIONS. (See SERVICE ORDERS.)

PLANT AND MACHINERY ACCOUNT. (See PLANT RECORDS.)

PLANT—DEPRECIATION OF. The amount of depreciation on all kinds of plant is a charge to establishment expenses, and the item dealt with in detail according to the kind of plant and the method of costing in use. For instance, the amount which relates to the plant used for the generation, supply and transmission of power may be charged to the Power Department, if the object is to ascertain the total expense of that service department.

When the plant assets consist only of electric motors or other forms of prime movers, the amount of depreciation will be charged to the departments where they are installed; alternatively, the expense is apportioned on the basis of horse-power consumed when one power unit serves several departments.

Heating Plant. The depreciation on this kind of plant is usually charged to the one account, which also receives debits for the various other expenses incurred by this service department, the object being to ascertain the total cost of heating, this being finally allocated to the respective departments on the basis of cubic area. With small concerns the amount of heating plant in use may not warrant this treatment, and the amount of depreciation is then dealt with according to the method of recovering expenses in costs; for instance, if the percentage on direct labour method is used, the depreciation charge is simply apportioned over the Factory and Selling Departments, whereas with the machine rate method the amount will require to be further analysed to the respective producing departments.

The treatment of depreciation in the cost accounts follows on very much the same lines as for repairs and maintenance charges, to which reference should be made respecting the various other forms of plant. (See also DEPRECIATION.)

PLANT RECORDS. The amount of expense incurred in connection with the repair and upkeep of all plant and machinery will be a very big item with some concerns, and a detailed record of each piece of machinery is desirable. The amount of capital expended in the purchase of plant is usually debited to one, or perhaps two accounts in the financial books, and a complete inventory of each item should be made by means of a "plant record card."

The advantage of using cards enables the inventory to be arranged and kept by departments or other form of division, so that when machines are transferred from one department to another or to a different part of the factory, the record card can be moved accordingly; likewise when a piece of machinery has become obsolete, its card can be removed from the drawer and filed among other "obsolete" cards.

The advantages obtained from the use of plant records may be summarized under the following headings—

1. Shows the book value of the individual items of plant.
2. Provides a check on the total capital value of assets which appear in the financial accounts.
3. Provides a system for recording the repairs, maintenance, and depreciation charges.
4. Enables depreciation rates for each class of machine to be accurately ascertained.
5. Provides the basis for gauging the efficiency of the respective types of machine tools when considered in conjunction with production statistics.
6. Enables correct values to be fixed in connection with insurances and the assessment of losses due to fire, etc.

When detailed records of plant have not been maintained, it will be necessary to prepare a complete list of all machinery and to classify and value each item, numbers and symbols being then assigned and painted on each machine tool. A plant record card is then made out for each item, and full particulars entered thereon as to the makers, date received, total cost, location, and depreciation rates, etc., and the card filed in order of machine number under its respective department or group.

A specimen plant record card is shown on page 235, and which is designed to contain the above particulars, also the cost of all repairs, etc.

The cost of repairs and maintenance, when done on the premises, will be ascertained by means of service orders, or from the maker's invoice if carried out by them, and the total each month posted to the respective record card.

Depreciation will be entered upon the card each month or other period, according to system, the " total " columns added and the balance carried down. The repairs and maintenance, also depreciation, columns are not added until the end of each year, as it will be necessary to ascertain the total amount that has been posted to each card for the purpose of making any adjustment that may be necessary between the actual amount of repair charges and depreciation as obtained from the cost records, and the amounts included in the annual Profit and Loss Account and Balance Sheet.

Similar records to the above should be kept for all other assets, including large tools, but records of small perishable tools, such as files, hammers, small drills, etc., should be separately maintained by the tool stores.

(See also REPAIRS AND MAINTENANCE.)

PLANT—REPAIRS AND MAINTENANCE. The total expense of maintaining and keeping in good repair all plant used for the generation, supply, and transmission of electric or other power is a charge to the Power Department, the object being to ascertain the total expense of this service department, so that the producing and other departments of a business can be debited with the cost of power, etc., consumed by them.

On the other hand, if electrical energy is purchased outside and the plant assets only comprise electric motors or gas engines, etc., the cost of maintenance may either be charged to the departments where the power units are installed, or, in cases where one motor serves more than one department, the expense is apportioned on the basis of horse-power consumed by the respective departments.

Form No. 63.

MACHINE.
Symbol ....
No. ......

PLANT RECORD CARD

CARD No. ....

DESCRIPTION ....
....

Location.	DEPRECIATION.		Date Received.	Maker.	Price.
	Amount per Month.	Rate per Annum.		Purchase Order No......	

Date.	Details.	Order No.	Repairs and Maintenance.			Deprecia-tion.			Total.			Date.	Details.	Total.		
			£	s.	d.	£	s.	d.	£	s.	d.			£	s.	d.

Repairs and maintenance charges are sometimes taken into consideration when establishing a depreciation rate for the power plant, and in such cases the repair expense will be charged to the Reserve for Depreciation—Plant Account. (See also REPAIRS AND MAINTENANCE and SERVICE ORDERS.)

PLANT—UPKEEP OF. (See SERVICE ORDERS.)

POSTAGES. Expenditure in connection with the postage of correspondence, also parcel post, is included in establishment expenses. This item is then apportioned to factory, selling, and administration, according to the extent to which it is estimated the expenditure is incurred by each section of the business.

In cases where separate mailing departments are used, the actual expense for each section is ascertained and charged direct to the Factory or Selling, etc., Expense Accounts.

Parcels post should be treated quite separately from the money expended on letter post, and the expense in this direction transferred to " carriage outwards " and included among selling expenses.

POWER EXPENSE. The total expenditure incurred in the generation, supply, and transmission of power.

The power expense of a factory may be subdivided according to the kind of power generated or used, such as—

- STEAM—
    - Raising.
    - Distribution.
- ELECTRICITY—
    - Generation.
    - Distribution.
    - Transmission.
- COMPRESSED AIR, ETC.

The various items which go to make up the total power expense of any business will depend upon the kinds of power generated and the type and amount of machinery used, and the following statement will give a general idea of the expense items that may be included—

- FUEL—
    - Coal.
    - Cartage on coal.
    - Wharfage on coal.
    - Oil.
- WATER.

MISCELLANEOUS SUPPLIES—
- Oil.
- Waste.
- Sundries.

SALARIES AND WAGES—
- Chief engineer.
- Assistant engineer.
- Firemen.
- Boilermen.
- Oilers and wipers.
- Attendants.
- Coal handling.
- Ash removal.

ADMINISTRATIVE EXPENSES (portion transferred from administrative expense).

REPAIRS AND MAINTENANCE—
- Boilers.
- Conveyors.
- Condensers.
- Economizers.
- Electric generating plant.
- Electric transforming plant.
- Electric distribution system.
- Transmission plant.
- Compressed air plant.
- Electric lighting system.
- Hydraulic system.

DEPRECIATION ON EACH KIND OF PLANT.

INSURANCE ,, ,, ,,

RATES AND TAXES ,, ,, ,,

The apportionment of certain of the expense items, such as depreciation, rates, etc., can only be dealt with on a logical basis if the capital value of each type of plant is kept separately or classified accordingly.

It is important that a true cost of the respective kinds of power generated and used be obtained, as it will not only form the basis for charging the Producing and Service Departments with the power consumed, but will enable a business to compare the cost of its own power with that of outside services.

The distribution of the power expense to the respective Service or Producing Departments is usually made at the end of each month by ascertaining the total cost of each power service and charging the departments according to the actual consumption.

The charges to the respective departments may be transferred direct from each of the Power Expense Accounts, or the total cost of the various forms of power entered on a combined statement, and a summary of the amounts chargeable to each department or service shown at the foot of the combined statement. (See also SERVICE ORDERS.)

SUMMARY OF POWER EXPENSE

	£	
Steam Raising	3,500	
Steam Distribution	250	
		3,750
Electricity Generation	2,900	
Electricity Distribution	750	
Electricity Transmission	1,500	
		5,150
Compressed Air	500	500
TOTAL POWER EXPENSE		£9,400

DISTRIBUTION OF STEAM EXPENSE

DESCRIPTION.	Lb. of Steam.	£	s.	d.
Electricity Generation, etc.	6,750,000	2,812	10	–
Heating	400,000	166	13	4
Drying Ovens	230,000	95	16	8
Baking Ovens	300,000	125	–	–
Steam Hammers	520,000	216	13	4
Pumps, High Pressure	490,000	204	3	4
Pumps, Foundry	280,000	116	13	4
Miscellaneous	30,000	12	10	–
	9,000,000	£3,750	–	–

DISTRIBUTION OF ELECTRICITY EXPENSE

	£	s.	d.
Electric Power Expense	5,150	–	–
Service Charge—Steam	2,812	10	–
TOTAL	£7,962	10	–

DESCRIPTION.	Kilowatt Hours.	£	s.	d.
Machine Tools (analysed to each group of machines or departments) . .	15,288,000	6,370	–	–
Compressed Air Plant	1,528,800	637	–	–
Lighting (analysed to departments) .	764,400	318	10	–
Electric Cranes	1,320,000	550	–	–
Electric Welding.	348,000	87	–	–
	19,249,200	£7,962	10	–

DISTRIBUTION OF COMPRESSED AIR EXPENSE

	£	s.	d.
Compressed Air Expense . .	500	–	–
Service Charge—Electric Current .	637	–	–
	£1,137	–	–

(The distribution of compressed air is usually noted at the foot of the account summarizing the cost, as the total is charged to machine tools or Tool Expense Account.)

POWERS ACCOUNTING MACHINES. THE PUNCHED CARD METHOD. The Powers system makes use of a mechanical method of controlling an operation by means of holes punched in a card.

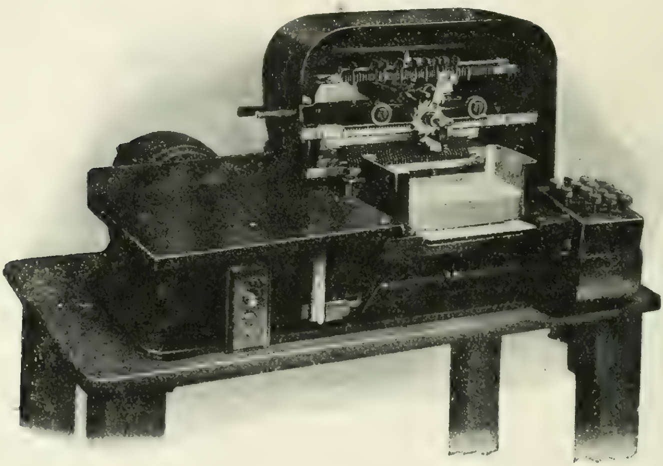
Herein lies the main advantage of the Powers method in that the card is mechanically sorted into a variety of sequences or groups, and made to reproduce the message it contains back again into the usual symbols. By so doing the card remains a permanent record that may be put to service repeatedly in order to print the accounts, statistics or any figure work required.

The attainment of accuracy is advanced by reducing the opportunities of clerical error to the minimum—a condition best obtained by the provision of untiring mechanism, where possible, to assist human endeavour. The result, besides being a gain in accuracy, will increase the speed of operation which, in its turn, is a true measure of the cost.

The Powers system approaches very closely to this ideal, only one clerical entry being required to produce the mechanical carrier which may then be used in combination with other similar carriers to write up the books and collect the statistics.

Powers machines have been designed to punch and sort the cards, and to reproduce the data contained thereon, or, in other words, to tabulate the data. As an instance of this last, take the quarterly income tax return for wage-earning employees; in this case, the weekly or daily job cards may be sorted under employees, and the total wages for each for the quarter printed opposite the clock number.

As there are three main functions to be performed, the machines naturally fall into the same divisions, namely, punches, sorters, and printing tabulators.



THE POWERS AUTOMATIC KEY PUNCH

There are three types of Powers punches—

(*a*) The automatic key punch, with power punching, feed, and ejection.

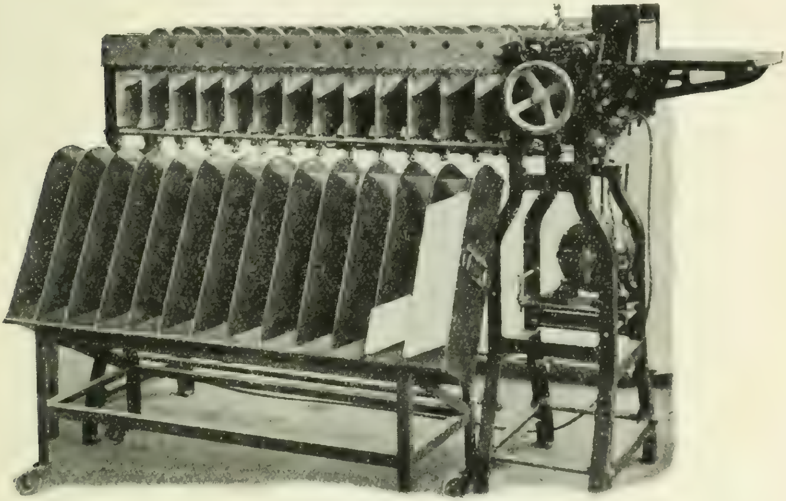
(*b*) The visible key punch, with power punching and ejection. The whole of the card is visible for use when the information is written on and time stamped upon the card.

(*c*) The printing punch, which, besides being visible, prints on the card, simultaneously with punching, the information punched thus providing visual verification. This is a hand operated machine.

The first two machines provide gang punching simultaneously with detail punching, and all three are fitted with a full set of adjustable skip stops, so that any fields on the card not required may be quickly passed over.

The Powers sorter is a high-speed machine dealing with over 20,000 cards per hour per column. Its boxes are conveniently arranged in a horizontal position for easy handling. A series of counters may be fitted, consisting of one for each box, with a grand and sub-total, or the latter two only.

These machines dealt with 890 million cards during the 1921 English census.



THE POWERS SORTER

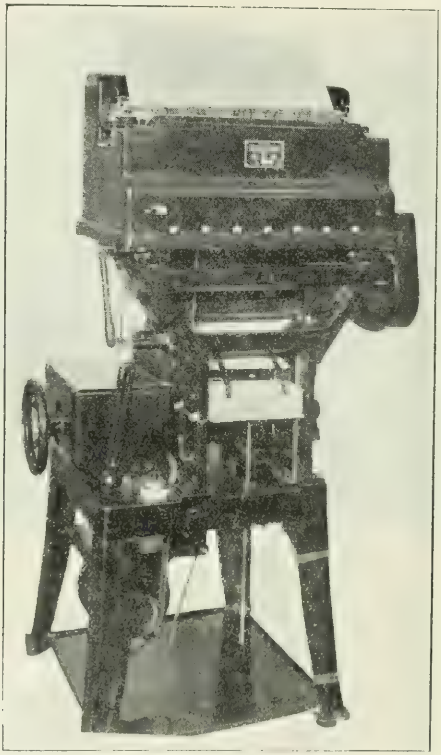
The Powers tabulator performs the final operation, its function being to reproduce the meaning of the holes which have been punched into the card.

The machine in its essentials consists of three main assemblies—

1. The adding machine.
2. The sensing apparatus.
3. The connection box between the two.

The adding machine is constructed on the Dalton principle, and in the largest machine consists of seven groups of figures, or units, each containing ten figures. These units may be decimal adding, £ s. d. adding, or alphabetical, as may be required; each will print all the information punched into the card and, with the exception of the alphabetical, will add and print the totals when desired.

The sensing apparatus contains also the card feed, and consists of two sets of pins, each set containing a pin for every possible position on the card. The top set of pins, when raised by the lower ones, passing through the card, lift the wires of the connection box and so control the movements of the adding machine.

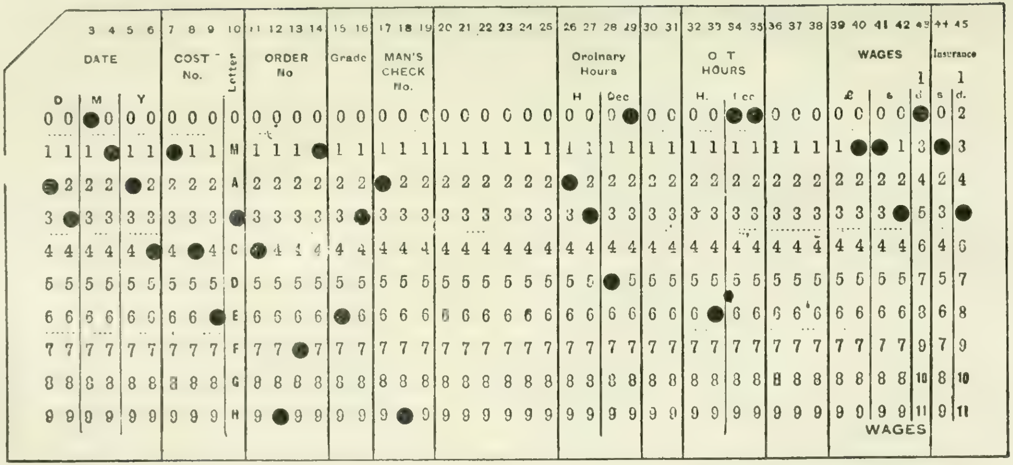


THE POWERS TABULATOR

The connection box is a simple unit consisting of an aluminium casting containing a number of wires, which are bent in order to connect the card positions of the sensing mechanism with the positions of the adding machine. By this means entirely different card forms may be used on the same tabulator, and the change may be made rapidly and without error by a girl operator, because no cross connections are possible with the unit construction provided.

Form No. 64.

POWERS JOB CARD



The punched card here illustrated may be used for debiting labour cost to the order or Cost No. and for crediting the employee with wages, a procedure which becomes possible for such grades of labour as are continually on one operation throughout the week.

The card reads as follows: 23rd Jan., 24, Cost No. 146B, Order No. 4971, Labour Grade 63, Man's Check No. 290, Ordinary Hours 23·50, Overtime hours 6, Wages £1 13s. 0d., Insurance 1s. 3d.

The cards are designed to suit the particular application in every case, the fields, i.e. the number of columns retained for each piece of information being ruled and headed for easy reading.

Form No. 65.

COST SUMMARY SHEET

Date. D.	M.	Y	Manuf'g Dept. or Stores.	Selling Dept.	Clock No. or Class of Material.	Order No.	Process.	Machine No.	Hours or Price.		Unit.	Quantity	Amount.			Total.		
1	3	5	2	4	1234	2141	1	5	9		1	50		9	0			
1	3	5	2	4	1239	2141	1	6	21		1	60	1	0	0			
1	3	5	2	4	1241	2141	1	6	22		1	75	1	3	8			
1	3	5	2	4	1243	2141	1	7	24		1	60	1	4	0			
											*		*3	16	8			
										Factory Expense			5	15	0			
3	3	5	4	4	1562	2141	2	11	11		1	40		9	4			
3	3	5	4	4	1564	2141	2	12	21		1	69	1	6	8			
3	3	5	4	4	1567	2141	2	13	22		1	72	1	7	3			
3	3	5	4	4	1573	2141	2	15	24		1	74	1	8	4			
											*		*4	11	7			
										Factory Expense			6	17	4			
7	3	5	6	4	2502	2141	3	21	31		1	54	1	7	6			
7	3	5	6	4	2509	2141	3	22	32		1	61	2	1	8			
7	3	5	6	4	2513	2141	3	25	34		1	75	2	1	6			
7	3	5	6	4	2519	2141	3	26	26		1	55	1	6	8			
											*		*6	17	4			
										Factory Expense			10	6	–			
1	3	5	3	4	146	2141			12		3	240	12	0	0			
1	3	5	5	4	1567	2141			3		3	20		9	0			
											*		*12	9	0			
										Labour			15	5	7			
										Material			12	9	0			
										Factory Expense			22	18	4			
										Total Cost						50	12	11

Powers machines are mechanically operated, electricity being confined to the driving motors.

For the collection and totalling of items as is the requirement for costing, such equipment is entirely suitable, because the item bearing cards may be sorted again and again under the various designations for different purposes, and they may be added together with great rapidity and absolute accuracy.

The illustrations on pages 243 and 244 show a costing sheet as produced by the machine, and a Powers card which is used in its production.

PREDETERMINED COSTING. (See Standard Costing.)

PREDETERMINING INDIRECT EXPENSES. (See Establishment Expenses.)

PRELIMINARY EXPENSES. The expense incurred in connection with the formation, etc., of a company is not included in the cost accounts, as this item relates entirely to a Profit and Loss Account transaction.

PREMIUM OR BONUS EARNINGS—RECORD OF. The premium or bonus earnings of employees are usually recorded in such a manner that any abnormal earnings on the part of individual workers in respect of the same operation can be notified to the Planning or Progress Departments. The reporting of abnormal bonus earnings is important, as it is then possible for the departments concerned to investigate such items with a view to taking the necessary steps for the rectification of any errors that may have been made.

A specimen record card is given on page 246. It will be seen that any alterations or modifications following an investigation are noted in the remarks column, so that the cards will contain a complete history of any changes made either in regard to the time allowed, rates, or method of manufacture. A separate card should be allocated to each article or to every single operation on such article, and filed either under the name of the article or component, name of operation, or symbol number.

The information posted to this record is obtained from the respective job cards or work tickets and the name of the operator, rate, quantity passed and rejected, and the rate of bonus entered in the appropriate columns, together with the time allowed and time taken.

The record of premium or bonus earnings as described above is arranged and indexed under the name of the article or operation and, in addition, or in place of this record, it may sometimes be desirable to prepare a record of the total amount

Form No. 66.

RECORD OF BONUS EARNINGS

COMPONENT OR ARTICLE..

OPERATION.................................... OPERATION NO................ DRG. NO.................................

SYMBOL NO.

TYPE.

Date.	Name of Worker.	Rate.	Clock No.	Order No.	Quantity Passed.	Quantity Rejected.	Time Basis.	Rate of Earnings.	Notified to Planning Dept.	Remarks (Modifications, etc.)

of bonus earned by each worker from week to week. In such a case the record may take the form of cards or loose sheets, of which the illustration shown on page 248 is an example. In this instance the records are indexed either under the name of the worker or clock number, and at the end of each pay week all the job cards relating to the one worker are collected and entered thereon. When such a record is used it provides the management with useful information in regard to the amount of the bonuses earned, also whether each worker is maintaining his rate of output, especially when engaged upon standard production.

For instance, the figures in the column headed " amounts earned " will immediately show the variations, if any, of bonus earnings, and when workers are performing standard operations any fluctuations in earnings can be investigated and suitable action taken where necessary.

With such a record, therefore, it is possible to gauge the efficiency of each worker in so far as it relates to his increased output or bonus earnings.

PRICE LISTS. (See CATALOGUES—COST OF.)

PRICING STORES REQUISITIONS—METHODS OF. The pricing of stores requisitions usually presents some difficulty in cases where the purchase price of materials fluctuates or where a number of separate consignments of an article are received at varying prices. The nature of the industry which is being carried on will to a great extent determine the basis of material pricing, whereas the method of cost finding and the detailed system in use will usually determine at what point and by whom the prices are inserted on the requisition. For instance, with some concerns, stores requisitions are priced by the Cost Department from a record of prices kept by them, or the requisitions may be sent to the Purchasing Department, who price them from their records, whereas in other cases the stock record clerk may carry out this work.

From the above it will be seen that a consideration of this subject will fall into two categories: firstly, at what figure shall issues of materials be priced ; and secondly, by whom shall the requisitions be priced ?

The various methods of pricing material issues are as follows—

1. At actual purchase price.
2. At average purchase price.
3. At present market price at time of consumption.
4. At purchase price of highest price stock.

Form No. 67.

PREMIUM AND BONUS PAYMENTS

Sheet No.......................

Name of Worker.. Rate.......................... Clock No.......................

Date.	Order No.	Description of Work.	Rate Earned.	Amounts Earned.			Weekly Total.		
				£	s.	d.	£	s.	d.
			Carried Forward						
				Carried Forward					

(*Size of Form* 10″ deep by 8″ wide)

1. **Actual Purchase Price.** The pricing of materials consumed in production at their original purchase price is the best method to use whenever conditions will permit of its adoption. With this method it is necessary to keep a record of prices by " lots," so that when each issue is made it can be priced at the original figure, i.e. at the price of the oldest stock on hand. The method is best illustrated by the following statement—

Receipts.			Issues from Stock.		
Date.	Quantity.	Price.	Date.	Quantity.	Price.
July 29	500	2/6 each	July 30	250	2/6
,, 31	1,000	2/3 each	Aug. 1	200	2/6
			,, 3	300	50 at 2/6 250 at 2/3
			,, 4	500	2/3

It will be seen from the above that two prices are inserted on the stores requisitions whenever the balance on hand of the one lot is not sufficient, necessitating a quantity being drawn from the next lot to fill the requisition. This method of pricing by " lots " does not require that the stock be kept by " lots " also, as the record of prices can easily be noted on the stock record card.

The advantages of this method may be stated as follows—

(*a*) It provides the only means of ascertaining accurate material cost, as an estimated or average price is not used.

(*b*) It avoids the accumulation of obsolete stock, since materials are presumed to be used in the order purchased.

(*c*) A company is able to safeguard its profits when tendering and accepting a contract on the basis of current material prices by contracting for materials. Any rise or fall in prices would not then affect costs.

The original purchase price method is specially suitable for almost all kinds of stores items and particularly in those cases where prices fluctuate violently, but with such staple materials as scrap and pig iron for foundry work, etc., the difficulties of storage and handling, etc., may render the method unsuitable.

When this method is adopted it is good practice to record the purchase price of materials on the stock record card, which is usually kept by the Cost Department, and in advocating this it does not necessarily imply that the stock record card must show the values of stocks on hand as well as quantities. Provision can be made for noting the purchase prices of materials simply by allowing three or four columns on the left-hand side of the card, as shown on page 251.

With the above ruling of stock record card the "values" of stocks on hand are ascertained through a system of stores control accounts.

2. **Average Purchase Price.** This is a method that is sometimes used when pricing certain bulk materials such as pig iron, coke, sand, etc. A considerable amount of clerical work is involved with this method, as every change in the purchase price of each consignment received requires a recalculation of the average figure which is used for pricing stores requisitions.

Clerical errors are therefore frequently made with this method, unless an elaborate system of check is provided.

The average price of each item is calculated by adding the quantity and value of each consignment received to the balance of stock on hand, and dividing the total value by the total quantity, e.g.—

Assume that an item of stock to be $\frac{5}{8}$ in. Hex brass rod, and on 1st June the balance on hand is—

		£	s.	d.
	3,400 lb. at 6d. lb. . .	85	–	–
On 2nd June there is received				
	2,500 lb. at 8d. lb. . .	83	6	8
	= 5,900 lb.	£168	6	8

therefore $\frac{£168\ 6s.\ 8d.}{5{,}900} = 6{\cdot}848d.$ per lb.

All issues of materials would now be priced at 6.848d. per lb. until the next consignment is received, when the price is again recalculated as follows—

			£	s.	d.
June 3rd.	Issues . .	4,425 lb. at 6·848d. per lb. .	126	5	2
	Balance on hand,	1,475 lb. at 6·848d. per lb. .	42	1	6
,, 5th.	Received . .	3,025 lb. at 9d. per lb. .	113	8	9
	Balance on hand,	4,500 lb.	£155	10	3

therefore $\frac{£155\ 10s.\ 3d.}{4{,}500} = 8{\cdot}294d.$ per lb.

In order to reduce the amount of clerical work entailed by this continual averaging of prices, it is sometimes the practice

Form No 68.

Location :	**STOCK RECORD CARD**					File Under :
Used for	Description					
	Date					Dimensions
Average Weight	Min.					
Per	Max.					

Purchased.					Issued.			Balance in Stock.	Appropriations.		
			Quantity.								
Date.	Order No.	Price.	Ordered.	Recd.	Date.	Order No.	Quantity or Weight.		Order No.	Quantity.	Balance Available.

(*Size of card* 8″ × 5″.)

to calculate all prices at the end of the month and to use this figure throughout the ensuing period ; alternatively, to average the price for the month during which the issues were made, and to price the stores requisitions accordingly. With the latter method it is necessary to hold up all stores requisitions until the month end—a practice which cannot be recommended in many cases.

The use of the average method of pricing requisitions will generally lead to great differences when an attempt is made to reconcile the cost accounts with the total purchases and stocks on hand, etc., for any long period, and in those instances where the average material price is used for estimating purposes, there is always the danger that materials will be figured at a higher or lower rate than the actual purchase price.

3. **Present Market Price at Time of Consumption.** The pricing of stores requisitions at current market price is a method more usually adopted by concerns who purchase large supplies of raw materials well in advance of their requirements.

A " Materials " or " Stock " Adjustment Account for each class of material is used with this method, so that the difference between current market price and purchase price can be ascertained. The balance of the account is transferred to Profit and Loss Account at convenient periods.

Assuming that six months' supply of pig iron is purchased for the foundry under contract at 6d. per lb., and that during this period the market price was—

1st month . . .	6¼d. lb.
2nd ,, . . .	6½d. ,,
3rd ,, . . .	7d. ,,
4th ,, . . .	6¾d. ,,
5th ,, . . .	8d. ,,
6th ,, . . .	7½d. ,,

the pricing of all issues and adjustments would be dealt with in the following manner—

					£	s.	d.
Deliveries —	1st month,	5,000	lb. at	6d. per lb.	125	–	–
	2nd ,,	5,000	,,	6d. ,,	125	–	–
	3rd ,,	7,500	,,	6d. ,,	187	10	–
	4th ,,	5,000	,,	6d. ,,	125	–	–
	5th ,,	10,000	,,	6d. ,,	250	–	–
	6th ,,	2,500	,,	6d. ,,	62	10	–
		35,000			£875	–	–

			£	s.	d.
Issues—1st month,	4,000 lb.	at 6¼d. per lb.	104	3	4
2nd ,,	3,500	,, 6½d. ,,	94	15	10
3rd ,,	9,000	,, 7d. ,,	262	10	–
4th ,,	4,500	,, 6¾d. ,,	126	11	3
5th ,,	9,000	,, 8d. ,,	300	–	–
6th ,,	3,500	,, 7½d. ,,	109	7	6
	33,500		£997	7	11

The issues during the period are charged to the foundry (i.e. Cost of Melt Account) at market prices and a Pig Iron Adjustment Account credited. The Stores or Material Control Account is then credited at the actual purchase price, the corresponding debit going to the Pig Iron Adjustment Account.

JOURNAL ENTRIES

		Dr.			Cr.		
		£	s.	d.	£	s.	d.
(21)	*Cost of Melt Account.*						
	Issues of Pig Iron—						
	(March) 4,000 lb. at 6¼d.	104	3	4			
	(April) 3,500 ,, 6½d.	94	15	10			
	(May) 9,000 ,, 7d.	262	10	–			
	(June) 4,500 ,, 6¾d.	126	11	3			
	(July) 9,000 ,, 8d.	300	–	–			
	(August) 3,500 ,, 7½d.	109	7	6			
	To Pig Iron Adjustment Account				997	7	11
	Journalizing value of Pig Iron issued at current market price at time of consumption.						
(22)	Pig Iron Adjustment Account	837	10	–			
	To Raw Material Stores Control A/c				837	10	–
	Being transfer of Pig Iron issued from stores during six months ending 31st Aug., 19........ at purchase price, i.e. 33,500 lb. at 6d. lb.						
(23)	Pig Iron Adjustment Account	159	17	11			
	To Profit and Loss Account				159	17	11
	Transferring balance of former account to the latter account, being difference between the actual purchase price and current market price of pig iron consumed during six months ending 31st Aug, 19....						

COST OF MELT ACCOUNT

Dr. *Cr.*

			£	s.	d.						
192__	Pig Iron—	J E.									
Mar. 31	4,000 lb. at 6¼d. .	21	104	3	4						
Apr. 30	3,500 „ 6½d. .	21	94	15	10						
May 31	9,000 „ 7d. .	21	262	10	–						
June 30	4,500 „ 6¾d. .	21	126	11	3						
July 31	9,000 „ 8d. .	21	300	–	–						
Aug. 31	3,500 „ 7½d. .	21	109	7	6						

(Note this account will also contain particulars of other metals used, etc., also labour, and may not be in the form of an ordinary Ledger account.)

PIG IRON ADJUSTMENT ACCOUNT

Dr. *Cr.*

			£	s.	d.				£	s.	d.
192__						192__					
Aug. 1	ToPig Iron issued from stores at purchase price, i.e.— 33,500 lb. at 6d.lb	J E. 22	837	10	–	Mar. 31	By Cost of Melt Act. Pig Iron issued at market price— 4,000 lb. at 6¼d. .	J E. 21	104	3	4
31	To transfer to Profit and Loss Account . .	23	159	17	11	Apr. 30	3,500 „ 6½d. .	21	94	15	10
						May 31	9,000 „ 7d. .	21	262	10	–
						June 30	4,500 „ 6¾d. .	21	126	11	3
						July 31	9,000 „ 8d. .	21	300	–	–
						Aug. 31	3,500 „ 7½d. .	21	109	7	6
			£997	7	11				£997	7	11

RAW MATERIAL STORES CONTROL ACCOUNT

Dr. *Cr.*

			£	s.	d.			J E.	£	s.	d.
192__						192__					
Mar. 31	To Purchases .		125	–	–	Aug. 31	By Issues . .	22	837	10	–
Apr. 30	„ „ .		125	–	–		„ Balance c/d., being balance on hand at this date .		37	10	–
May 31	„ „ .		187	10	–						
June 30	„ „ .		125	–	–						
July 31	„ „ .		250	–	–						
Aug. 31	„ „ .		62	10	–						
			£875	–	–				£875	–	–
Aug. 31	To balance b/d. .		£37	10	–						

(Note the debits and credits to this account will include the value of all purchases and issues of raw materials such as tin, copper, lead, etc., in addition to pig iron, etc., as the object of such account is to control the values of all raw material stock (see COST CONTROL ACCOUNTS). In the example given only the amounts are given which are represented by the issues of pig iron.)

4. **At Purchase Price of Highest Priced Stock.** The only advantage claimed for this method is that of precaution, as it

is presumed that its adoption will safeguard a manufacturer against a decrease in the market price of materials. Reconciliation of costs with the total purchases and stocks on hand, etc., is only possible if a Materials Adjustment Account is used in a similar manner to that described for method No. 3, but the great amount of extra clerical work entailed will rarely justify the adoption of this method. When estimates are prepared, and the purchase price of the highest priced stock is used for figuring the material costs, business may be lost because tenders will be too high.

PRIESTMAN METHOD OF REMUNERATING LABOUR. Co-operative production, introduced by Messrs. Priestman Bros., Ltd., Holderness Foundry, Hull, is a method designed to bring about a better feeling in industry by creating confidence between the workers and the employers, and by rewarding the workers according to their increased energy and the exercise of their intelligence.

The system of co-operative production replaces individual work by team work and co-operative effort, and, as all contribute to the improvements that are made under it, all share in the benefits that accrue from it. It, therefore, includes all employees without exception—managers, clerks, and labourers, as well as those engaged more directly on production.

The principle of the method is very simple. If 100 men working 100 hours produce 10,000 articles, then if on another occasion these men produce 12,000 articles in a similar time, they have done 20 per cent more work, and hence receive 20 per cent more wages. Under this system everyone receives his increase on his salary or wages.

The standard of output which forms the basis of calculations under this method is arrived at by finding what has actually been done during a certain period. The output during any subsequent period is then compared with the standard, and if there is an increase the percentage is calculated and each employee receives a similar percentage of increase on his wages or salary for that period. In general, the standard is obtained by taking the output over a normal period, the longer the better, allowances being made for abnormal conditions, such as short time, and averaging the output in relation to the hours worked.

In the majority of cases, however, this simple basis cannot be used: the "point" or "unit" method must then be applied. This consists in allotting values to the various products, after which the total production may be obtained by multiplying the value of each part of the product by the quantity produced and adding the results together. This method is exceedingly flexible, and no matter how much the different classes of product vary in quantity, the output figures bear a true relation to the standard when the correct values have been assigned.

When once a standard has been fixed, it should not be altered, except by mutual consent of the management and employees, but that it must be altered on occasions is obvious ; for instance, if improved methods of production are introduced, such as the installation of labour-saving machinery, the standard must be altered accordingly.

It is important that the works committee or other representative of the employees should agree the standard of output, as confidence is essential to the success of this scheme. For this reason, the employees must be satisfied that the figures are correct, so that there can be no complaint afterwards of unfairness ; furthermore, their representatives should have the right of inspecting the periodical figures of output on which the amount of bonus is payable, and also have access to the books so far as output is concerned.

The authors of this method claim that it is by this right of inspecting books and agreeing to the standards that confidence in the system is created.

It will be noted from the above that the Priestman system has nothing to do with wages rates, except to use them as a basis on which to pay bonus. (See also REMUNERATION OF LABOUR, METHODS OF.)

PRIME COST. Part of factory cost, and is the sum of direct materials, direct labour, and direct expenses.

PROCESS COSTING. There are several methods of costing, viz., job costs, multiple costs, terminal costs, single costs, operating costs, process costs, etc., and the method best suited to any particular business is decided by the nature of manufacturing activity and the lines of organization in operation. In considering which method is applicable to a certain trade or business, it is necessary to classify industries in accordance with their lines of organization and product. By so doing it becomes possible to indicate the methods which are specially applicable to any particular organization.

Costing by the process method is considered much simpler than most other methods, inasmuch as in the majority of instances it does not entail the same amount of routine and the variety of forms, etc., as are required in other methods.

The process method is adaptable to any trade where uniform and continuous manufacture is carried on, and where one or more articles of a batch lose identity in the process of manufacturing and ultimately becomes part of a larger volume of production; or, in other words, form part of the actual finished article. This method is largely used in the chemical, paint, varnish, printing inks, canning, biscuit, mining, quarrying, and tanning industries, also in food products, gas and electricity undertakings; indeed, it is used to advantage in any trade whose business is concerned with the production of a definite article, be it liquid, solid or gas.

It is to be observed, however, that there are certain manufacturing businesses that owing to the special nature of their organization, although coming within the above, exempt themselves from this category. The character of their production constitutes the only basis of decision as to which method is best suited to them.

The principle function in process costing is to arrive at the cost of each variety of operation or process; an account is kept for each operation and it is debited with the cost of materials, labour employed, and also a proper percentage of expenses. Any credits arising from the sale of by-products or disposal of waste, etc., are credited to the process in which the credit occurs, and the balance shown represents the cost of the quantity produced.

Direct Materials—Treatment of in Process Costing. In a works manufacturing a standard article the general practice pursued is to work to a recognized formula or definite works order. The method of procedure is similar to that described concerning job costing. Such formula, or works order, serves as instructions to the various production departments throughout the factory. The works order should contain full particulars of the materials required, quantities, weights, etc., and a copy would be handed to the Cost Department. This copy acts as the basis for charging the various processes with the materials, and also gives the necessary details for finally ascertaining the cost.

Regarding the issue of materials from the stores, it is not always necessary or advisable to issue these in small quantities by means of a stores requisition as is the case with job costing, as they may be delivered in bulk to the various manufacturing departments against the issue of a definite formula or works order Exception would, however, be made in the case of bulky or weighty materials and where it might be inconvenient

Form No. 69.

TIME SHEET

Name.. Clock No.....................

Trade..

Week Ending.................................19........

	Dept. 1.			Dept. 2.			Dept. 3.			Dept. 4.			Daily Total.
	On.	Off.	Total.	On.	Off.	Total.	On.	Off.	Total.	On.	Off.	Total.	
M.													
T.													
W.													
Th.													
Fr.													
S.													

For Wages Department Use.

Approved by...

Foreman.

for a department to receive more than a given quantity at one time, owing to lack of space for storage.

As manufacturing proceeds in the various production shops, and the materials having been worked on are transferred from one department to another, the process accounts in the Cost Ledger will require to be written up, ruled off, and the balance " carried forward " and charged to the department receiving the article (or material) for the next operation or process, as will be observed in the accounts which follow. The routine of issuing the materials from stores against the works order, or formula, will provide the necessary data for crediting the Stores Control Account and charging the respective process accounts. In the case of materials found to be faulty, these would be returned to the stores, and the department concerned would receive credit in the usual way, i.e. through the medium of a rejection note.

Direct Labour—Treatment in Process Costing. So far as regards direct labour, this represents wages paid on direct manufacture, whether paid on piece work basis or by fixed weekly sums. It may happen that all the workpeople in each department are continuously engaged on one process, and the charging of direct labour to each process will present little or no difficulty, as the departmental pay sheet can be so ruled and arranged to give the desired information.

On the other hand, where the course of manufacturing necessitates two or more operations in the same department, or it may be where a workman is working in one department and then another, it is essential that daily or weekly time sheets be put into operation, so as to obtain the analysis desired. These time sheets will be ruled to suit the requirements of any business, but the specimen given is sufficient to indicate what is required.

The starting and finishing time expended on any job or process are entered on this time sheet by the employee (or in some works the method is to clock on and off), and the foreman of the department is responsible for checking and vouching these records. At the end of a given period, either daily or weekly, the time sheets are passed into the Wages Department, where they are checked and compared with the workers' gate cards, and the pay roll made out from the information and records so obtained. The necessary credit entry required for the Wages Control Account is taken from the totals of the pay roll, and the corresponding debit to the individual process accounts created.

Form No. 70.

PAY ROLL

Week Ending.......................................19.....

Clock No.	NAME.	Total Hrs.	Rate.	Gross Wages.	Deduction.	Net Wages.	PROCESS DEPARTMENTS.				SERVICE DEPARTMENTS.					
							Printing.	Tin Box Making.	Liquid Paste Making.	Card Box Making, Labelling, etc.	1	2	3	4	5	6

(*See also illustration of pay roll on pages* 47 *and* 223.)

Expenses—Treatment of in Process Costing. The principle involved in the collection and allocation of expenses is similar to that employed in materials and labour, viz., on the department basis. An expense allocation statement is worked out and prepared for a given period of either six or twelve months, and a division of the total made so as to produce a daily, weekly, or monthly figure, i.e. if the custom of the works is a weekly basis, one-fiftieth part of the yearly total of the expenses in each department would be charged to the Departmental Process Cost Account in total, or in detail if desired. Should there be more than one process carried out in any one department, a further division of the total departmental expenses would require to be made, and each definite process charged with its proper share of expenses, and these amounts journalized as a credit to the department's Expenses Control Account and debited to the various Process Cost Accounts in such department.

As the materials in course of manufacturing pass through the various stages of making into the finished article, they will increase in value, i.e. further material, labour, and expense will have been added to them. As an example, assume an article entering the Packing Department, the cost of the various packing materials used—may be wood boxes, paper, string, labels, etc.—also labour and expenses incurred in the Packing Department, will be added to the value of the article under consideration.

Upon the article reaching its final stage and being ready for sale, the various process costs are summarized and the final cost obtained.

The object being to ascertain the cost of each process, it is necessary to consider the nature of the procedure in manufacture in order that some kind of classification can be given. Assume, therefore, an ordinary sized factory, comprising, say, ten departments, four of which are manufacturing departments (or production shops) and the remaining six " expense " or " service " departments.

MANUFACTURING DEPARTMENTS—

1. Tinplate printing.
2. Tin box making.
3. " Liquid paste " making.
4. Card box making and packing.

EXPENSES DEPARTMENTS—

(*a*), (*b*), (*c*), (*d*), (*e*), and (*f*).

Further assume a factory making a "liquid," filled in tin boxes, packed in cartons of standard size, and sold in packages of grosses.

The procedure in manufacture may be said to be as follows—

1. Tinplate printing.
2. Tin box making.
3. "Liquid paste" making and filling tins.
4. Card box making, labelling, and packing.

Having received a works order for 622 gross of a certain "liquid" in tin boxes and packed in cardboard boxes complete, the operations or processes will be as follows.

Tinplate printing in the usual way constitutes two processes, viz., printing and/or varnishing and stoving. The sheets of tinplate pass through a printing machine, and each colour as printed entails a further operation or process, viz., stoving (being a technical term used for drying). The sheets upon leaving the printing machine are placed into racks and put in a hot air oven and dried. This is necessary before further colours are printed thereon. It will be gathered, therefore, that there are two processes, viz., printing and/or varnishing and stoving, and the process accounts would be worked out in accordance with the specimen Process Accounts Nos. 1 and 2.

Form No. 71.

TINPLATE PRINTING DEPT.

PROCESS No. 1.	
Printing Lids.	W.O. No. 84

PROCESS COST ACCOUNT

Dr. *Cr.*

Date.			£	s.	d.	Date.			£	s.	d.
1925. July 9	To Materials—					1925. July 9	By Balance c/f. to A/c. No.2		127	–	
	40 boxes of Tinplate at 45/– per box		90	–	–						
	,, Inks and varnishes . .		2	–	–						
	,, Direct Labour and Supervision .		20	–	–						
	,, DirectCharges		10	–	–						
	,, Direct Expenses .		3	–	–						
	,, Indirect Expenses . .		2	–	–						
			£127	–	–				£127	–	–

Form No. 72.

TINPLATE PRINTING DEPT.

PROCESS COST ACCOUNT

PROCESS NO. 2.	
Stoving Lids.	W.O. 84

Dr. *Cr.*

Date.						Date.					
1925.			£	*s.*	*d.*	1925.			£	*s.*	*d.*
July 9	To Process No. 1 b/f . .		127	–	–	July 9	By Balance c/f. to A/c No. 3		142	–	–
	,, Direct Labour		10	–	–						
	,, Direct Expenses .		5	–	–						
			£142	–	–				£142	–	–

The printed sheets of tinplates are next sent into the Tin Box Department, where the operation of stamping out and making the tins is performed. As will be observed from the Process Accounts Nos. 3 and 4, further materials are issued to the Tin Box Department, viz., tinplate required for stamping out the "bodies" of the tins (the "lids" only being printed). There are two processes effected in this department, viz., (1) stamping out, and (2) lipping and beading, and the accounts will appear as follows—

Form No. 73.

TIN BOX DEPT.

PROCESS COST ACCOUNT

PROCESS NO. 3	
Stamping out Lids & Bodies	W.O. 84

Dr. *Cr.*

Date.						Date.					
1925.			£	*s.*	*d.*	1925.			£	*s.*	*d.*
July10	To Process No. 2 b/f. . .		142	–	–	July10	By Product (A/c. No. 7)—Tinplate Cuttings 30 cwts. at £3 per ton[1]		4	10	
	,, Direct Materials—44½ boxes Tinplate at 50/		111	5			,, Balance c/f. to A/c No. 4		260	15	
	,, Direct Labour		4								
	,, Direct Charges		3								
	,, Direct Expenses .		5	–	–						
			£265	5	–				£265	5	–

---

[1] See By-products A/c, No. 7.

Form No. 74.

TIN BOX DEPT.

PROCESS NO. 4.	
Lipping & Beading Lids & Bodies.	W.O. 84

PROCESS COST ACCOUNT

Dr. *Cr.*

Date.			£	s.	d.	Date.			£	s.	d.
1925. July10	To Process No. 3 b/f. . .		260	15	–	1925. July10	By Balance c/f. to a/c. No. 5		270	5	–
	,, Direct Labour		6	–	–						
	,, DirectCharges		2	10	–						
	,, Direct Expenses .		1	–	–						
			£270	5	–				£270	5	–

It will now be realized that the tin boxes are complete and ready to be filled with "liquid paste" and packed. The empty tins are, therefore, delivered to the Paste Department, and the process performed in this department is: Making paste, filling and lidding tins, and the Process Cost Account will appear as follows—

Form No. 75.

LIQUID PASTE MAKING DEPT.

(FILLING AND LIDDING TINS)

PROCESS NO. 5.	
Making Liquid & Filling Tins.	W.O. 84

PROCESS COST ACCOUNT

Dr. *Cr.*

Date.		T.	C.	Q.	L.		£	s.	d.	Date.			£	s.	d.
1925. July11	To Process No.4 b/f. . .						270	5	–	1925. July11	By Balance c/f to A/c No.6		325	5	–
	,, Materials .						10	–	–						
	,, Direct Labour .						25	10	–						
	,, Direct Charges .						14	10	–						
	,, Direct Expenses .						5	–	–						
							£325	5	–				£325	5	–

From this department the filled tins are sent to the Cardboard Box Department, where they are packed in cartons, labelled and completed for dispatch, the Process Account showing as follows—

Form No. 76.

CARD BOX DEPT.

CARD BOX MAKING
LABELLING AND PACKING

PROCESS COST ACCOUNT

PROCESS No. 6.	
Card Box Making, Labelling & Packing.	W.O. 84

Dr. *Cr.*

Date.		T.	C.	Q	L.	£	s.	d.	Date.		£	s.	d.
1925.						£	s.	d.	1925.		£	s.	d.
July 11	To Process No. 5 b/f .					325	5		July 11	By Product (A/c No. 7) Card Waste .	5	–	–
	,, Materials (Cardboard, etc.) .					30	–	–		,, Balance, being factory cost of product .	392	5	–
	,, Direct Labour .					24	10	–					
	,, Direct Charges .					7	10	–					
	,, Direct Expenses .					6	–	–					
	,, Indirect Expenses .					4	–	–					
						£397	5	–			£397	5	–

Form No. 77.

No. 7.

BY-PRODUCTS ACCOUNT

Dr. *Cr.*

Date.	Details.	£	s.	d.	Date.	Details.	£	s.	d.
1925.		£	s.	d.					
July 10	By products from Process A/c No. 3, Tinplate Cuttings	4	10	–					
11	,, products from Process A/c No. 6, Cardboard Waste	5	–	–					
		£9	10	–					

Form No. 78.

WORKS ORDER NO. 84. 9/7/25

622 GROSS...........................

PROCESS COST SUMMARY

DEPARTMENT.	Process.	Wages.			Process Materials.			Direct Charges.			Direct Expenses.			Indirect Expenses.			Total.		
		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
PRINTING (Tin Plate) . .	No. 1	20	–	–	92	–	–	10	–	–	3		–	2	–	–	127	–	–
	No. 2	10	–	–							5	–	–				15	–	–
TIN BOX MAKING . . .	No. 3	4	–	–	111	5		3	–	–	5	–	–				123	5	–
	No. 4	6	–	–				2	10	–	1	–					9	10	–
LIQUID PASTE MAKING (Filling & Lidding Tins)	No. 5	25	10	–	10	–	–	14	10	–	5						55		–
CARD BOX MAKING (Labelling & Packing) .	No. 6	24	10	–	30	–	–	7	10	–	6	–	–	4	–	–	72	–	–
		90	–	–	243	5	–	37	10	–	25			6	–	–	401	15	–
Less : By-Product A/c.—																			
Process 3	4 10 -																		
Process 6	5 – –				9	10	–										9	10	–
		90	–	–	233	15	–	37	10	–	25	–		6	–	–	392	5	–

Memorandum—

112 sheets = 1 box of tinplate.
40 boxes stamped out for LIDS, each sheet of which produces 20 lids.
∴ 40 boxes of tinplate = 622·22 GROSS LIDS.
44½ boxes stamped out for BODIES, each sheet of which produces 18 bodies.
∴ 44½ boxes of tinplate = 623·00 GROSS BODIES.
For accounting purposes, 622 gross of completed article.

There is no hard and fast rule in process costing so far as actual routine or the ruling of forms are concerned. The foregoing description, however, is sufficient to indicate the general principles of the process system of costing. (See BY-PRODUCT COSTING, also COST FINDING—METHODS OF.)

PRODUCTION EXPENSES. (See FACTORY EXPENSES.)

PRODUCTION ONCOST. (See FACTORY EXPENSES.)

PRODUCTIVE DEPARTMENTS. (See MANUFACTURING DEPARTMENTS.)

PRODUCTIVE HOUR METHOD OF RECOVERING EXPENSES. (See DIRECT LABOUR HOUR METHOD OF RECOVERING EXPENSES.)

PRODUCTIVE WAGES. (See DIRECT LABOUR.)

PUNCHED CARD METHOD OF COSTING. All statistical work in costing and other business procedure consists of adding together the same original entries under different groups and sequences. These entries of facts and data are, however, subjective things, which are normally represented by symbols ; they are not material things which can be of themselves mechanically handled.

The Hollerith, Paramount, and Powers systems make use of a method of controlling the above operation by means of holes punched in a card, and a full description of each of the above systems will be found under their respective headings.

PURCHASE ORDERS. (See PURCHASING.)

PURCHASE REQUISITION. The "originator" of a purchase is equally important as the placing of the actual order, and only responsible officials should, therefore, be given the authority to instruct the buyer that a purchase is to be made. A form known as a "purchase requisition," and ruled similar to the specimen shown on page 268, is therefore brought into use to serve as the official notification that certain goods are required.

The authority to originate a purchase will be invested with different officials, according to the nature of the goods which have to be purchased. For instance, the storekeeper may be

Form No. 79.

PURCHASE REQUISITION

P.R. No. 1875.

To be handed to Buying Dept. immediately. Date..192...............

Production or Sales Order No.................

QUANTITY.	DESCRIPTION :	REQUIRED FOR
		Stock
		Job
		Specification
		Part of Order
	Date Required. .... Signed..	
	From whom generally obtained..	Dept. Use

Order Dispatched............... 192.... To..

Purchase Order No.. .. .. Delivery Promised..

Signed

Buyer.

authorized to issue purchase requisitions for the replenishing of his stocks of general materials immediately he observes they have reached the minimum or re-order quantity, likewise the works manager, Planning Department, or drawing office may requisition any special materials required for an order, whereas general stationery and sundry office supplies may be requisitioned by the secretary or departmental head, and factored goods by the Sales Department.

The specimen purchase requisition given contains spaces for inserting the production or sales order number for which the goods are required, or in the case of sundry expense items, the service order number. If, therefore, the requisition is issued by the Planning or other Works Department, the works order number will be quoted. On the other hand, requisitions issued by the Sales Department would have the sales order number inserted on them. The necessity for quoting such references will be apparent when it is remembered that the goods must be identified upon receipt.

When the storekeeper is given authority to issue purchase requisitions for general stores items, it is desirable that some form of check be provided, and this may conveniently be arranged by the storekeeper sending his requisition to the Cost Department, so that it can be compared with the stock record card. Furthermore, if a storekeeper is instructed to check the quantity of articles or materials in stock at the time of making out his requisition, his bin card and the stock record card of the Cost Department can be reconciled and the purchase requisition then " O.K.'d " and passed on to the buyer.

PURCHASING. The purchasing routine will necessarily differ according to the trade and the amount of materials consumed in production, consequently there can be no standard method or system that can be applied to this branch of a business.

In small businesses, for instance, the purchasing of materials is generally carried out by the proprietor, his works manager or chief clerk. The ordering of materials would not be a big job and the routine involved would, therefore, be of a simple nature. An official order, however, is essential, and with the class of business now under review this may quite conveniently take the form of a duplicate order book.

Whereas this method may be all that is necessary to the small " one man " business, a large manufacturing concern will require a more elaborate system on account of the numerous items of materials that must be purchased. It therefore follows that the function of buying must be properly delegated and reduced to method, as only one department or individual should be authorized to do the actual purchasing.

With most manufacturing concerns the amount of work entailed in regard to buying is such that a separate department will be required. The chief of this department is usually known as the "buyer," and his duties may be to keep in touch with sources of supply, markets, be familiar with prices, specifications, quotations, and deal with the manufacturers and merchants in regard to placing of orders.

All requirements for goods would come through the channel of this department by means of what is known as a purchase requisition, made out by responsible officials of the staff. For instance, a works manager or departmental foreman might be authorized to requisition orders for raw materials; likewise a storekeeper for such indirect materials as tools, nuts, bolts, utensils, etc. Similarly, the draughtsman for drawing materials and the chief clerk for stationery, etc., the actual issuing and placing of orders, however, being carried out by the Buying Department. Whenever technical points arise concerning any goods requisitioned, the buyer would consult with the departmental chief.

Upon receipt of a purchase requisition the Buying Department will at once take the necessary steps to obtain quotations if desired, or order the goods immediately. In the case of quotations being obtained the buyer must satisfy himself that the materials offered will comply with any special requirements, and be assured that the price is a fair one. The ordering of the goods having been sanctioned by the buyer, an order with the requisite number of copies is made out on an official form, which may be ruled similar to the illustration given on pages 271 and 272.

The loose-leaf order book is advised and appeals to most firms inasmuch as it offers many advantages over the ordinary fixed-leaf books. There is no reason why orders should not be typed, thus making clear and distinctive records. They should be signed by the buyer or his authorized assistant, and the number of copies required will naturally depend upon the routine of each concern, but for the purpose of illustration four copies are here dealt with—

Original. This is dispatched to the supplier.

First Copy. Retained in Buying Department for checking invoices when received.

Form No. 80.

Telephone Nos.......

Telegrams ....

Codes used........

PURCHASE ORDER

No.........**1865**........

It is essential that this Order No. be quoted on all Invoices, Advices, etc.

FROM

THE PIONEER MANUFACTURING CO., LTD.,
GLOBE WORKS,
BRADFORD, YORKS.

Reqn. No.....*364*....

W.O. No.....*733*....

To—

MESSRS.......................................

....

....

Date..............................192.........

Please supply the following Goods in accordance with the Terms and Conditions stated on the back hereof, and deliver same to our Works, Carriage..............................per...

Item No.	Quantity	Description.	Rate.	£	*s.*	*d.*
		Signed.........................				
		(*A useful size for Orders is 10 by 8 inches.*)				

Form No. 81.

Duplicate Copy

PURCHASE ORDER

No.....**1865**........

Reqn. No.....*364*....

W.O. No.....*733*....

Date..192............

Recorded in Cost Dept.	Order Checked.	Order Completed.	Invoice Passed for Payment.	Remarks.

Item No.	Quantity	Description.	Rate.	£	s.	d.
		(N.B.—*On the back hereof suitable columns are printed for recording such particulars as are required. These details are inserted by the Buying Dept. on receipt of invoices, Inwards Goods Notes, etc., and cover Item No., I.G. No., Invoice No., with Dates, Received, Defective, Date Cleared, Remarks, etc.*)				

Second Copy. Handed to the storekeeper as a notification that the goods are on order. After making the necessary record, he passes it on to the goods receiving clerk, who retains same for the purpose of checking goods when received.

Third Copy. This is retained by the buyer for the purpose of following up the order, etc.

When it is desired that the second copy should not contain the prices at which the materials or goods have been purchased, the price columns are usually ruled for the purpose of recording some useful data for either the storekeeper or goods receiving clerk, and the prices omitted from these columns by the means of inserting a small piece of carbon paper.

With regard to the first copy, which is retained by the buyer, it will be observed that a space is provided for noting on the stock record cards in the Cost Department. This copy is, therefore, passed into the Cost Department where the necessary records are made concerning the purchase, and the price at which the materials are bought. This is necessary for the pricing of materials in connection with costs, etc. (See PRICING STORES REQUISITIONS—METHODS OF.) After completing these particulars, the copy of the purchase order is returned to the buyer.

It is a custom in most factories not to insert prices on the copies distributed, excepting that which is retained by the buyer, the prices being treated as confidential.

Ignoring the controversial question as to whether the storekeeper and others should be informed of the purchase price of materials, the space can be very profitably utilized for recording particulars required by the various departments concerned. In the specimen form illustrated, the Receiving Department copy could be specially ruled with columns to allow the receiving clerk to enter against each item the quantities received, weights, condition of goods, etc., and the initial of the individual counting or weighing, etc., this information often proving very useful.

Regarding the third copy, retained by the buyer for the purpose of following up and urging delivery, etc., on the reverse side will be ruled columns for the following information: (*a*) "Item No.," (*b*) "Urged," (*c*) "Date promised." Items number (*b*) and (*c*) are repeated across the sheet, and the last column on the right-hand side headed "delivered." This copy is filed under due date of delivery promised, and the clerk will take out of his file each day copies of those orders which are due for delivery, and if no advice is to hand from the supplier stating that the goods have been dispatched, he will take steps to urge delivery.

As already stated, a buyer will only purchase goods against a purchase requisition, and therefore before proceeding with a description of the routine involved, attention must be given to the information contained in the requisition.

A specimen purchase requisition is illustrated on page 268, from which it will be observed that a space is provided at the top right-hand corner for the production, works, or sales order number. If the requisition emanates from the planning or some other department in the works, the works order number for which the particulars are required must be stated, together with full particulars of the goods, etc.

This reference number, together with the serial number of the requisition, is inserted in the space provided on the order, and the requisition is filed under the works or sales order number in the buyer's office, being available for future reference. When goods are purchased for resale only, the purchase requisition will be issued from the Sales Department, who will quote the sales order number in place of the works or production order number. In such cases it may be necessary to provide the Sales Department with a copy of the purchase order.

By following this method of reference it will be seen that the goods are easily identified when they are received.

Upon the receipt of any goods into the factory it is essential that a proper record be made, otherwise there can be no check against suppliers' invoices.

It is a common practice in some factories to record the receipt of goods in a duplicate book ruled somewhat as shown on page 275.

The duplicate page is torn out, either when filled or at the end of each day, and passed into the buyer's office. This system has its advantages in the smaller factory, where a few items daily might be received, but when a considerable number of deliveries are made each day, the delay that occurs in the writing up of the stock records, and more particularly in notifying either the storekeeper or buyer of the receipt of goods, more than outweighs any advantages that the system may possess.

Another method is that of recording the receipt of each consignment of goods on separate slips or notes. This system has many advantages, and its extra cost in stationery is negligible compared with its efficiency.

Form No. 82.

GOODS RECEIVED SHEET

No.........**1357**...

....192..

From.	How Consigned.	No. of Cases.	Particulars.	Condition.	Remarks.	Signature of Receiving Clerk.

Form No. 83.

INWARDS GOODS NOTE. *(Copy for Buying Department)*

I. G. No.

12578

Received from

CARRIER.

CARRIAGE.

QUANTITY.	DESCRIPTION.	WEIGHT.
Package Description: *Purchase Order No.:* *Required for:*	DATE– *(The first copy, which is ruled as this, is retained in the book.)*	

Form No. 84.

INWARDS GOODS NOTE. *(Attach this copy to goods)*

RECEIVED INTO STORES.

DATE.................................... SIGNATURE....................................

INSPECTED AND PASSED.

DATE.................................... SIGNATURE....................................

I.G. No.

........*12578*........

QUANTITY.	DESCRIPTION.	WEIGHT.
Package Description : *Purchase Order No. :* *Required for :*	INSPECTOR'S SIGNATURE....................................	......*12578*......

The form illustrated, which may be known as a "goods received note" or "inwards goods note," gives an example. The number of copies required will depend upon how many departments are concerned with the receipt of goods, but for the purpose of explaining the principles of the method under review it is assumed that three are sufficient immediately to notify those concerned with the receipt of goods, instead of waiting a day or more, as in the case of the former method. It is important that the Receiving Department be instructed to sign for all goods as "unexamined," except in the case of small parcels which can be verified at sight, and when making out the "inward goods note" to state thereon the condition in which the case or package was received.

It is usual for an advice note to be sent by the supplier of the goods at least a day before the goods are received, and the fact that the goods have been dispatched will be noted in the buyer's office on their copy of the order, and the advice note passed on to the Receiving Department. This serves to warn the receiving clerk that the goods may be expected, and enables him to make any special arrangements that may be necessary for their storage, etc.

Upon receipt of the goods the receiving clerk will enter on the inwards goods note full details of each item, and for this purpose he will use the copy of the purchase order already in his possession. The quantity received must not be copied from this purchase order, but only inserted after an actual count or weighing of the materials. Particular care should be exercised in noting the condition of the goods and state of packing, etc., also the name of carrier or railway company, and whether consigned carriage paid or forward. The purchase order number will also be transferred from the copy of the order, together with the production or sales order for which the goods are required. The second and third copy of the inwards goods note is then torn out of the book, one copy being handed to the buyer and the other attached to the goods. The buyer on receipt of his copy will duly enter against the particular item in his records that the goods have been received, at the same time noting any remarks regarding their condition, etc. The quantity received and the quantity ordered should then be compared, also the method of transit. Should the buyer already be in possession of the supplier's invoice, this is not passed for payment until after receipt from the storekeeper of his advice that the goods are delivered into his stores. The importance of this will be seen later.

The next step is the removal of the goods into the stores, but before this is done provision has to be made for the inspection or test of the goods, in order to ascertain whether they comply with any specification previously notified to the buyer on the purchase requisition. With large concerns it is sometimes necessary that a permanent inspection staff be attached to the Receiving Department, and when this is found desirable the system required for the inspection of goods will not present much difficulty, because this function can be discharged at the same time as the receiving clerk is unpacking, counting or weighing, etc. However, with smaller firms it is usually found more convenient for the Inspection and Test Department in the works to undertake the inspection of those goods received which must comply with some special requirement, leaving the storekeeper to inspect most of the general stock items. The system used in connection with the inwards goods notes illustrated conforms with the latter, and with this method the receiving clerk will notify the Works Inspection Department whenever any goods are received which must be subjected to a special test.

After testing and inspecting the materials the inspector will initial the third copy of the inwards goods note in the space provided, and the receiving clerk will then pass the goods over to the storekeeper, who, after signing for their receipt, places them into their correct position in the stores and enters the item on the bin card.

It will be noted that the third copy of the inwards goods note is perforated across the top portion, and that the inwards goods number is repeated on both portions. This top portion serves as a receipt from the storekeeper that he has duly received the goods into stock and is, therefore, sent to the buyer as a notification to him that the goods have also passed inspection.

Sometimes an occasion will arise when part of the goods or materials are rejected, and in such cases the inspector will make out a rejection note for such items, stating the reason, and attach same to the copy of the inwards goods note, which is sent with the remainder of the goods to the storekeeper. This rejection note is then passed on to the buyer with the top portion of the inwards goods note. It is stated above that the buyer will not pass the supplier's invoice for payment on receipt of his copy of the inwards goods note, but will wait until he receives the notification from the storekeeper that the goods have been received by him, and that they have passed inspection. The necessity for this procedure will now be apparent, as there will always exist the possibility that a part of a consignment may be rejected.

The buyer is only now in the position, therefore, to check the supplier's invoice and pass to the Accounting Department for payment. The buyer's copy of the inwards goods note, together with the storekeeper's receipt and rejection note, if any, is now handed to the Costing Department for recording on the stock record cards which are kept in that department.

PURCHASING DEPARTMENT—EXPENSES OF. (See Buying Department—Expenses of.)

RATE CARDS. Cards used for recording the rates of pay of each worker. With many of the large concerns there will usually be an Employment Department, whose chief duty is to ensure that a regular supply of the right type of labour is always available, and in such cases they will usually retain the "employee's record card," which may also contain particulars relative to the rates of pay of each worker. In these circumstances the wages section of the Cost Department may require a separate record for the purpose of checking the wage rates, etc., when issuing or calculating the times on the gate cards, job cards or work tickets. Alternatively, in those cases where the checking of rates is carried out by some other department such as the Rate Fixing Department or Planning Department, etc., the rate cards will be required by them in place of the Cost Department.

A specimen ruling of rate card is given, from which it will be noted that beyond the information contained at the head of the card, there will only be required columns to denote the commencing and subsequent rates of pay. It should be noted that when separate rate cards are in use, care must be taken to ensure that any change of rate is duly notified and entered thereon, and in those cases where the "employee's record card" forms the master card for such records, it is usually the practice that the rate cards be frequently checked with them; alternatively, the Employment Department may at frequent periods check the rates entered upon the gate or job cards. The actual method of check, however, will be governed by the type of organization and the number of time cards dealt with throughout a period.

RATE PER ARTICLE METHOD OF RECOVERING SELLING EXPENSES. (See Selling and Distribution Expenses.)

Form No. 85.

RATE CARD

NAME. . . . . CLOCK NO. . . . .

DEPARTMENT. . . . . TRADE. . . . . . RATE AT START

DATE . . .						
NEW RATE .						
AUTHORIZED BY						
DATE . . .						
NEW RATE .						
AUTHORIZED BY						
DATE . . .						
NEW RATE .						
AUTHORIZED BY						

RATE SETTING. Rate setting is the operation of fixing a time or price for the performance either of an operation or cycle of operations. There are two or three generally accepted methods.

The first consists of looking back through records to see if the operation or one similar has been done before. Then by taking into consideration the rate of wages paid when last done and the current rate, an *approximate* time or price is fixed which it is anticipated will be acceptable to the operative.

Another method adopted consists of timing the operation by means of a stop-watch concealed on the person of the rate setter. A time is secured, which is scrutinized by the rate setter, foreman, and other people concerned, and again an *approximate* time or price is fixed as above.

Yet again the foreman or rate setter is consulted and, based upon his experience and judgment, another *approximation* is made as before.

All these methods suffer from the same defect ; they are—and can only be—approximations, sometimes good, at others bad. They all lead to the evil of rate cutting.

Sharply distinguished from these methods are two of outstanding importance: the stop-watch time study and Gilbreth's method of the chronocyclegraph.

The first method consists of splitting an operation up into its elements and finding the time for each element. For example, suppose the work to be done is a planing operation, the following elements would be timed—

Time to lift work from floor and place on planer table.
Time to level and set work true on table.
Time to put on stops and bolts.
Time to rough cut $\frac{1}{8}$ in. thick, 24 in. long, 4 in. wide.
Time to finish cut $\frac{1}{16}$ in. thick, 24 in. long, 4 in. wide.
Time to remove stops and bolts.
Time to remove work to floor.
Time to clean machine.

It is evident that all classes of work can be reduced to elementary operations, each of which can easily be timed ; and that in course of time a valuable amount of information will be compiled to which reference can often be made to avoid repetition of time studies. It should be noted that allowances are made for fatigue and other unavoidable delays, and in many cases a further flat percentage is added for contingencies. For the machine work it is of vital importance that speeds and feeds should have been standardized and tables compiled, and from these the times are computed and checked by observation.

Needless to say, time study of this description can only be carried out with the co-operation of the worker, and it is just here that tact, knowledge, and a due sense of human relations is called into play.

The second method differs completely. Small electric lamps connected through an interrupter are attached to the worker's arms, head, etc. Behind the worker and machine or bench is erected a screen marked in squares of a known size. At a suitable distance a stereoscopic camera is set up, and a photograph of the whole or part of the cycle of operations is taken. This is really time and motion study combined. Knowing the size of the squares in the background and the number of interruptions per second, we are in a position not only to eliminate wasteful movements, but also to fix a time in which an operation should be carried out. In many respects this method is superior to the foregoing, as there can be no personal error in the observation. It can also be accomplished by means of the ultra-rapid kinema camera.

RATES. The amount of rates paid is included among the establishment expenses of a business.

The rates payable to local authorities are invariably assessed on " values," and the respective amounts are therefore capable of direct allocation. In the case of rates levied upon property, the basis of allocation to the Factory, Selling, and Administrative Departments will be the space occupied, whereas the rates assessed on machinery, etc., are allocated direct to factory expense and apportioned over the respective departments on the basis of the total value of machinery in each department.

Rates are classified as a " constant " expense.

RAW MATERIAL CONTROL ACCOUNTS. (See COST CONTROL ACCOUNTS, also STORES—FINANCIAL CONTROL OF.)

RECEIPT AND INSPECTION. A term often used when referring to the particular phase of storekeeping relative to the receipt and inspection of materials or goods. The work of receiving and inspection entails the checking of the quantity and quality, etc., of goods, and the recording of these upon a goods received sheet or inwards goods note. The work of stowing and recording immediately follows that of receipt and inspection. (See STORES ROUTINE.)

RECORD OF BIN INSPECTION. (See BIN INSPECTION.)

RECORD OF MACHINERY. (See Plant Records.)

RECORD OF PLANT. (See Plant Records.)

RECOVERING SALES EXPENSES. (See Selling and Distribution Expenses.)

RECOVERY OF EXPENSES. (See Computation and Recovery of Expenses.)

REDUCED OUTPUT—BASING EXPENSES ON. (See Establishment Expenses.)

REFERENCE RATE. METHOD OF REMUNERATING LABOUR. This is a variation of the Halsey premium. Instead of a standard time, a reference rate is fixed for each operation, and is rather more generous than the average cost at time rate. The premium is one-half the difference between the wages cost and the reference rate.

The effect is the same as the Halsey premium with a generous standard time. (See also Remuneration of Labour—Methods of.)

REJECTION NOTE. A note or certificate intimating that the materials or goods which are stated thereon have been rejected for a specified reason. A rejection note may refer to incoming materials (i.e. goods received) or to goods made in the factory. (See Goods Received—Rejection of, also Manufactured Goods—Rejection of.)

REJECTION OF INCOMING GOODS. (See Goods Received—Rejection of.)

REJECTION OF MANUFACTURED GOODS. (See Manufactured Goods—Rejection of.)

REMUNERATION OF LABOUR—METHODS OF. There is a great variety of methods of remunerating labour, most of which are successful under the special circumstances in which they are used. Some of them are very elaborate, such as that used by the Franklin Motor Co. in America, others extremely simple, such as the ordinary or straight "piece rate." Fundamentally, they are all divisible into two classes—

1. Payment by time or the time rate.
2. Payment per piece or the piece rate.

Co-partnership, profit-sharing, premium bonus, etc., and any variants of these are not strictly methods of remunerating labour, but are ancillary to the two main divisions. It is, however, convenient to consider them under this heading. All devices involving payment by results are variants of class 2, and it should be carefully borne in mind when comparing the various methods of rewarding labour that, with the exception of the ordinary day or time rate, they are based on a predetermined standard and payment is made on a basis of attainment.

The subject is one of extreme difficulty and somewhat contentious. Many of the ablest minds in this and other countries have been engaged on this subject for a considerable period up to the present without any degree of unanimity. The only point which appears to be common ground is that the reward should be commensurate with the effort expended and the efficiency attained, and that there must be a guaranteed minimum wage.

The following is a list of the different ways of remunerating labour, and a description of each appears under its respective heading—

1. Time rates or day work, day wage, time work, day rate.
2. Piece work, piece rate, straight piece rate.
3. Halsey premium.
4. Rowan premium.
5. Barth premium.
6. Taylor differential piece rate.
7. Merrick differential or multiple piece rate.
8. Gantt task and bonus.
9. Emerson efficiency bonus.
10. Knoeppel bonus.
11. Diemer combined bonus and premium.
12. Ficker (a method of sharing savings in time and expense).
13. Cost premium.
14. Reference rate.
15. List percentage plan.
16. Priestman system.
17. Contract system.
18. Co-partnership profit-sharing.
19. Franklin method.

The above list comprises the better known methods. It will be realized that as systems vary, not only from industry to industry but also from plant to plant even in the same locality, the task of tabulating every known method would be enormous.

RENT. The money paid for the use of land and buildings, etc., forms part of the establishment expenses of a business.

The actual amount paid is allocated to the Administrative, Selling, and Factory Expense Accounts on the basis of space occupied by the respective sections of the business.

In those cases where the factory expenses are analysed by departments, the amount of rent chargeable to each is apportioned on the basis of the space occupied.

Rent is classified as a " constant " expense.

RE-ORDER QUANTITY. A term used in conjunction with the operation of stocks upon a minimum-maximum basis, and indicates the point at which further stocks must be re-ordered. (See MINIMUM STOCKS.)

REPAIRS AND MAINTENANCE. The cost of keeping in good order the various properties, tools, etc., of a business may be debited to a " Reserve for Depreciation " Account when the depreciation rates include an allowance for maintenance charges, otherwise the expense is a separate charge to the Factory Expense Accounts.

In large factories the cost of repairs and maintenance for each department is separately ascertained by means of a system of service orders. This departmental analysis of expenses is also necessary when certain methods of recovering expenses in costs are used, such as machine rates, departmental rates, etc.

Repairs and maintenance charges are of two kinds—

1. Repairs which occur daily, such as to small tools, miscellaneous equipment, belting, etc.

2. Repairs of an extraordinary character, the cost of which is more correctly distributed over a long period of time. This expense may include the replacement of certain parts or work done which exceeds a predetermined limit.

The method of costing the work done on repairs and maintenance will depend upon the size of the factory and the works routine. With small concerns repair expenses are usually allocated direct to a general Repairs and Maintenance Account, or the cost of the work done charged to a " standing " or " service " order. At the end of the costing period the costs of each service order are ascertained and debited to either the General Repairs and Maintenance Account or to each department, and by this means they are included in the factory expense.

With larger concerns the cost of repairs will be dealt with according to their nature, and all labour, materials, and other expenses on sundry repairs which occur daily and which do not amount to more than a few shillings in each case, will be charged to a service order, but for repairs of an extraordinary character a special order should be issued.

A Plant Department or Repair Department will usually be maintained for this class of work, which will receive credit for the work done.

In arriving at the cost of each job a proportion of the Plant or Repair Department's expenses must be included in the cost summary, otherwise a true cost will not be shown.

Repairs and maintenance charges are classified according to the type or kind of asset similarly to the following, and may again be further classified as " fixed " and " loose "—

- Plant—
  - Power.
  - Heating.
  - Compressed air.
  - Hydraulic.
- Machine tools.
- Cranes, hoists, etc.
- Conveyors.
- Buildings.
- Land.
- Fixtures and Fittings. Works.
- ,, ,, ,, Offices.

REPLACEMENT OF DEPLETED STOCKS. A term which, when used in connection with the stores routine, refers to the replacement of general or standard stores items, when the quantity on hand has reached the re-order or minimum stock limit. With most concerns the procedure in regard to the replacement of standard materials and parts is for the storekeeper to notify the buyer that certain goods require ordering, and this may be done by making out a purchase requisition. (See Stores Routine.)

REQUISITIONS—PRICING OF. (See Pricing Stores Requisitions—Methods of.)

RESPONSIBILITIES AND DUTIES OF STOREKEEPER. (See Storekeeper—Responsibilities and Duties of.)

RETURNS TO STORES. (See Stores Credit Note or Rejection Note.)

REWARDS FOR GOOD TIMEKEEPING. Any reward or bonus paid to the factory employees for good timekeeping is an expense from which the factory will benefit and is, therefore, charged to and included in the factory expense rate. The amount of reward or bonus paid should be allocated to each department of the factory.

When rewards or bonuses are given to members of the office staff the amount is allocated to the administrative or selling expense.

ROWAN PREMIUM—METHOD OF REMUNERATING LABOUR. Under the Rowan method the worker's day rate is guaranteed. A standard time is fixed and if a saving is effected by the worker, a percentage equal to the percentage of saving is added to the time taken, e.g.—

Standard time . . .	100 hours.
Time taken. . . .	50 hours.
Percentage saving . .	50%
No. of hours paid. . .	50 + 50% of time taken, i.e. 25 hours, = 75 hours.

It is very important to consider carefully Mr. Rowan's definition of standard time, which follows—

"The standard time or time allowed is the average time which the average workman—neither the quickest nor the slowest—takes to do the job under ordinary time rate conditions, *when giving a fair rate of output for his time wages*—no more and no less." (The italics are mine.—Author.) This time standard is as indefinite as under the Halsey premium, and in view of the controversy which is still raging over the question of what is a fair day's work for a fair day's pay, the importance of the italicized part of the above definition will be appreciated. (See also Remuneration of Labour—Methods of.)

ROYALTIES. The amount paid by way of royalties may be dealt with either as a direct charge or included amongst the establishment expenses.

The actual basis of allocation and its treatment in the cost accounts, however, may depend upon the size of the business and the nature and amount of the royalties paid. If the royalty is a definite amount per article, it may be treated as a direct charge in costs, but in those cases where the royalty payable is calculated upon goods sold, the necessary adjustments will require to be made at stocktaking periods if the stocks are priced at factory cost.

Alternatively, the amount may be dealt with as a direct charge to the Cost of Sales Account, or the total royalties paid over a period included in the establishment expenses and allocated to the Administrative Expense Account.

In the majority of cases it is preferable to deal with this item by regarding it as a direct charge to the Cost of Sales Account, as by such means the amount of royalty is shown separately in the cost accounts, and not merged with the incidental expenses of manufacturing and selling which is the case if either of the other methods are chosen.

SALES EXPENSES. (See Selling and Distribution Expenses.)

SALES EXPENSE—CONTROL OF. (See Cost Control Accounts.)

SALES MANAGER—SALARY OF. The salary paid to a sales manager is one of the items which comprise the establishment expense of a business. When the selling and distribution expenses are recovered separately in costs, the amount is allocated accordingly.

SECRETARY—SALARY OF. The amount of salary paid to the secretary is included among establishment expense of the business. The allocation of the item will depend upon the duties performed by this official, as in many instances work which is not purely secretarial in nature will often be carried out by him.

With small concerns a secretary may be responsible for the general management of all office departments as well as attend to all correspondence and other sundry matters, in addition to the work of his own and the Accounting Department, but as the size of such a concern may not warrant the subdivision of expenses under the headings of factory, selling, and administrative, the allocation of the item will not present any difficulty, as all expenses will be grouped and recovered in costs as one total. In some instances, however, a secretary may perform all or some of the above duties in fairly large concerns, and in such cases the salary is apportioned over the respective sections of the business, according to the amount of time given to the respective functions.

With the very large concern the duties of the secretary will usually be confined to work of an entirely secretarial nature, and the amount of salary may then be allocated to the administrative expense or apportioned over the Factory, Selling, and Administrative Departments. The former method, however, is preferable.

SELLING AND DISTRIBUTION EXPENSE. Subdivision of establishment expense and comprising all the expenditure incurred in the sale and distribution of a firm's products, but excluding those items which enter into the cost of manufacture.

Selling expenses embrace such items as the salaries of the sales manager and selling staffs and branch offices, discounts allowed, cost of advertising and catalogues, commissions to agents, travelling expenses of sales staff etc., stationery, and also a proportion of lighting, heating, depreciation of buildings, etc., and share of the expenses incurred in the general and financial administration of the business when these are recovered separately in costs.

Examples of expenses that can be allocated direct are—

Salaries of sales manager, publicity manager, and Sales Department staff, travellers, etc.

Advertising and literature, catalogues, blocks and electros, circular letters, pamphlets, etc.

Commissions to salesmen and travellers, etc.

Discounts Allowed. Carriage Outwards.

Branch or District Office Expenses. Rent and rates, lighting, cleaning and caretaker's wages, local travelling expenses, commissions to district salesmen and travellers, postages, telephones and telegrams, salaries of typists, clerks, engineers, and inspectors, etc.

Examples of expenses that are usually " allocated " by apportionment—

Lighting and heating of head office, if forming part of general office and works buildings.

Repairs and maintenance of buildings, if forming part of general office and works buildings.

Expenses of the general and financial administration of the business.

Postages, telephones, transport expenses, etc., if not separately recorded.

With some industries the cost of packing and cases, etc., will be charged to selling expenses, and for a detailed consideration of such items, also those enumerated above, see under their respective headings.

Selling expenses are dealt with in costs, upon similar principles to those employed for works expenses, but the actual method used for recovering the expenses upon individual products, orders or processes will differ according to the nature of the industry. A great divergence of opinion exists as to what is the correct method of dealing with selling expenses in costs. It is contended on the one hand that selling expenses are incurred on orders *secured* and not on orders filled or completed by the factory. The correct treatment in such cases, therefore, requires that expenses be recovered by apportionment over the value of orders secured, and not expressed as an amount on the value of goods dispatched.

From the point of view of theory, this argument may be correct so far as it concerns any business that sells and delivers goods *ex* stock and at a fixed price, but considerable difficulty will immediately arise when an order is modified and necessitates an adjustment of the sale price. If an order were cancelled or the quantity reduced, the whole or a portion of the expense on the particular order would require to be written back, and the effect of such adjustments would render the cost accounts useless, as any possibility of comparison would be completely eliminated. To avoid this perpetual adjustment, and the carrying forward of expenses that have been allocated to an order secured but not yet delivered, the expenses of selling and distribution are best dealt with by recovering them by one of the following methods—

(*a*) As a rate per article dispatched and invoiced to customers.

(*b*) As a percentage on the works cost of goods dispatched to customers.

(*c*) As a percentage on the sales value of goods dispatched to customers.

(*a*) **Rate per Article.** The choice of any one of the above methods will naturally depend upon the nature of the industry which is carried on. For instance, if the business is engaged in making only one article, the selling expense can be dealt with easily by dividing the estimated total for the period by the number of articles sold and so arrive at a rate per article. This method could also be used with advantage when one or a few articles of the same kind are made in a range of sizes, as relative unit values can quite easily be fixed for each size. In those cases where this method can be used it will give more accurate results than (*b*), as the correctness of the figure used will only depend upon two estimates, viz., the estimate of the selling expenses, and the estimated number of articles that will be sold for the period.

(*b*) **Percentage on Works Cost.** Most firms will be engaged in the manufacture of several articles of varying sizes which have no relative values, and in such cases selling expenses may then be dealt with by either (*b*) or (*c*) above. The formula for ascertaining the percentage rate on works cost is as follows—

$$\frac{\text{Estimated selling expenses for period} \times 100}{\text{Estimated works cost of goods sold for period}}$$

With this method the element of chance is introduced to a greater extent than with either (*a*) or (*c*), as it will be seen that its accuracy depends upon correctly estimating not only what the selling expenses should be for the period and the quantity of goods to be sold, but the works cost of such goods. The method, however, is specially suitable for businesses engaged upon non-standard work, such as a repair shop, certain kinds of foundries, general engineers, cabinet making, and the like.

(*c*) **Percentage on Sales Value.** The method of recovering selling expense as a percentage on the sales or invoice value of goods sold will give very accurate results if used in those cases where a firm's products are standard, and sold more or less at fixed prices or at fixed discounts. The formula for ascertaining the rate at which expenses will be recovered under this method is—

$$\frac{\text{Estimated selling expense for period} \times 100}{\text{Estimated value of sales for period}}$$

The basing of rates upon the estimated normal maximum output or sales and using a standard rate for the period is preferable to the method of adjusting the rate from month to month to meet fluctuating demands, as all statistics in regard to expenses are then based upon standard performances. Any difference between the standard and the actual amount of selling expenses recovered in costs will indicate the loss to the business through insufficiency of orders. (See also ESTABLISHMENT EXPENSES.)

SELLING EXPENSE CONTROL ACCOUNTS. (See COST CONTROL ACCOUNTS.)

SERVICE DEPARTMENTS. The term "Service" (or "Expense") Department implies that the function of such department is to render service to all, or any, of the manufacturing departments. The exact size and specific functions of these auxiliary departments will vary in different industries. Frequently it may be decided to amalgamate two or even more functions into one department. A reasonable sized factory engaged in engineering may have Expense or Service Departments similar to the following—

1. Planning Department.
2. Progress Department.
3. Drawing Office.
4. Millwrights' Department.
5. Plant—Engineers' Department.
6. Welfare Department.
7. Tool Room.

8. Power Department.
9. Inspection or Viewing Department.
10. Receiving Department.
11. Stores Department.
12. Estimating Department.
13. Cost and Wages Departments.
14. Rate Fixing Department.

A brief outline of the functions performed by some of these departments will be found helpful.

Costing and Wages Department. The main functions of this department are quite apparent. The cost accountant is responsible for the operation of the entire cost system, in such a manner that every expense of the business is properly and automatically recorded on time cards, material sheets, job or cost cards, etc. His duties are wide and he is called upon for various figures covering every step in the process of manufacture, sale, and distribution of the company's products.

Planning Department. This department is concerned with the technical side of production throughout the factory. The course of procedure in the various processes of production is arranged and determined by this department. The issuing of works orders (in conjunction with the works manager) and planning of work throughout the factory, may sometimes form part of the numerous duties performed by the Planning Department.

Estimating Department. The main functions of this department are quite apparent, and with most concerns it forms a section of the Costing Department.

SERVICE ORDERS. The principles involved in the accounting and control of indirect expenses may be considered under two broad headings ; firstly, the accounting and control of expenses in total by means of a system of expense control accounts, and secondly, the accounting of such expenses in detail.

A system of expense control accounts will only control the expenses in total, and whilst this is necessary the control accounts alone are of limited managerial use, as they do not show in sufficient detail why or how the money has been spent. A system of service orders is therefore brought into use, so that the amount spent on each " service " or class of " indirect " work can be ascertained.

The problem of accounting for direct labour and direct materials does not present the same difficulty as the accounting for indirect materials, indirect labour, and indirect expenses. With the former it is possible to measure easily the quantity consumed in production and to deal with each item at the time it is used or paid for. With the latter, however, most of the facilities will be used before the amount of expense so incurred will be known and appear in the accounts as a liability. Such items are, therefore, dealt with on the basis of estimates, and at frequent periods the amount of expenses which will be recovered in costs is compared with those actually incurred.

A system of service orders will, therefore, play a very important part in any method of costing, as through them the cost of each class of service or indirect work is ascertained. Before the system of service orders can be brought into use the indirect expenses of a business must be properly classified, and in this direction it is not unusual for the items to be divided into two main groups, viz.—

1. Capital expenditure.
2. Revenue expenditure.

The service orders relating to capital expenditure will only include the cost of making and the installation of new plant, machinery, buildings, and equipment, etc., whereas the orders relating to revenue may comprise the expenditure on repairs, maintenance and upkeep, rearrangement and alterations, etc., and on all service departments, such as transport, supervision, storekeeping and material handling, inspection and viewing, general labouring, cleaning and sweeping shops, rectifying defective goods, attending to complaints of customers, experimental work, etc.

The division of the expense accounts into the two groups already mentioned clearly indicates the nature of the two forms of expenditure usually incurred by all manufacturing concerns. In the case of capital expenditure the total, other than small sundry amounts, will be transferred to the asset accounts in the financial books, whereas the total of the second group is a charge to Revenue Account.

The subdivision or sub-analysis of the two groups of expenses for the purpose now under review will usually follow somewhat on the lines already indicated, viz., firstly, in accordance with the nature of the expense, and secondly, the cause. In other words, the first step in the process of analysis is to summarize the expenses under the headings of repairs, maintenance and upkeep, rearrangement and alterations, supervision, general labouring, inspection and viewing, etc., and the next process is to sub-analyse each of these items in order that the amount incurred by each department is separately ascertained. In the case of repairs, maintenance and upkeep such analysis will, firstly, relate to the kind of asset, i.e. whether plant, machinery, buildings, tools or equipment, etc., and secondly, each of these divisions will be further analysed to show the amount of the expense incurred by each department. For instance, the analysis of the repairs, maintenance and upkeep expense of the plant may be sub-analysed as follows—

REPAIRS, MAINTENANCE, AND UPKEEP—PLANT

	Symbol.
Steam raising	*A* 1–1
Steam distribution	*A* 1–2
Electricity generation	*A* 2–1
Electricity distribution	*A* 2–2
Electricity transmission	*A* 2–3
Compressed air	*A* 3–1
Hydraulic	*A* 4–1
Heating	*A* 5–1
Gas	*A* 6–1

The sub-analysis of each item will naturally depend upon the size of the factory and the nature of the plant used, and in those cases where a company generates its own electricity, the cost of repairs and maintenance of the generating plant will naturally be a charge to the cost of electrical power. On the other hand, if the electrical energy is purchased, the maintenance charges may only comprise the cost of upkeep, etc., of motors and power transmission system, and in such a case the expense may be sub-analysed on a departmental basis.

With regard to the repairs and maintenance of machinery, this item will generally be analysed either according to the type of machines in use or by departments. By classifying each Expense Account in the manner indicated, it is not only possible to ascertain the total amount expended upon each expense item over a given period, but the total amounts are analysed to show the proportion of the expense incurred by the respective departments; in other words, the cause of the expense is ascertained.

The allocation of serial numbers to the respective service orders requires careful consideration, as the method of numbering must be sufficiently elastic as to allow of new service orders being added as the occasion demands, and without disturbing the sequence of each group or subdivision.

To facilitate this work it is desirable that symbols or letters be allocated to each group of expenses ; for instance, the letter " A " may be allocated to all service orders relating to new plant, and " M " to repairs and maintenance ; the letter " R " to the rearrangement and alterations of plant, etc., and " G " to cover all items of general shop expense, etc.

By such means the *class* of work that is being performed is denoted by the symbol letter, and the serial order number the sub-classification.

There is, however, a variety of methods of allocating symbols and numbers to service orders, two of which are illustrated below in connection with the detailed consideration of the more general items which are usually included among service orders.

Service orders relating to capital additions are usually dealt with in such a manner that the cost of the work done on each piece of new machinery can be separately ascertained.

The collection of the individual cost can be effected by the issue of a separate order for each job, and allocating a separate serial number to each order. For instance, if the serial order number, " S.O. 40," is allocated to machine tools, the first order issued for any work to be done can be numbered " S.O 40/1." The number 40 indicates the nature and account classification of the work to be performed, and the stroke 1 the separate account to which the cost is to be charged. The times of the men engaged upon the work, also all the materials issued from stores, will therefore be charged to this account number. When the next piece of machinery is made or delivered and ready for installation, the service order number issued will therefore be " S.O. 40/2," and the work entailed in connection therewith charged to the sub-account No. 2.

The ascertainment of the cost of any work done on each piece of new machinery is important, as without this analysis it is not possible to maintain a correct record of all assets. Similarly to the above, the work in connection with the repair maintenance, and upkeep of plant, machinery, and buildings should be analysed to show the expenditure incurred on behalf of the machine or group of machines and each building, etc.

Many other items of expense will require similar treatment ; for instance, the total amount of " idle " or " unallocated time," when collected by means of service orders, will require to be analysed in order to show the cause. This analysis may be effected by allocating a separate service order number to each subdivision; alternatively, one service order number is given to "unallocated time" and the subdivision, obtained by means of stroke numbers or symbols, as follows—

UNALLOCATED TIME

	Alternate Methods of Numbering.	
Machine breakdown	S.O. 406/1	*G*1–6*A*.
Waiting for tools	,, 406/2	*G*1–6*B*.
Waiting for materials	,, 406/3	*G*1–6*C*.
Belt breakdown	,, 406/4	*G*1–6*D*.
No work	,, 406/5	*G*1–6*E*.
Etc.		

The letter *G* indicates the main classification, i.e. general shop expenses; the figure 1, the nature of the expense item, i.e. indirect labour; and the figure –6, the subdivision of the main expense item, i.e. unallocated time; and the letters *A*, *B*, *C*, etc., the cause.

When a list of service orders are issued to the factory departments, they should always be accompanied by full instructions as to their use and the nature of the items to be charged against the respective numbers, as some orders will have booked to them both labour and materials, whereas others will only comprise labour.

On the other hand, certain work, such as the cleaning and sweeping of shops, oiling and cleaning down the machine tools, supervision, etc., will be performed as and when necessary and as part of the daily routine, whilst other work, as, for instance, special repairs to plant and machinery, rearrangement and alterations, etc., will only be carried out to special instructions, and at less frequent periods. With the former class of work an official works order or instruction sheet is not required for the individual jobs, since the various workers will be more or less permanently allocated to the respective tasks. With the latter, however, special orders are necessary.

An example of the instructions usually attached to the list of service orders is given on page 298.

The extent to which all expense accounts should be classified into groups will depend upon the nature and size of the business, and no attempt will be made to give a list of service orders that will be suitable for any or every factory. In the circumstances a detailed consideration of the more general items which may be included amongst service orders will serve a more useful purpose.

STANDING INSTRUCTIONS—Service Orders

The attached list of service order numbers will come into operation on.., all previous lists being cancelled.

The attached is based on an entirely different principle from all previous lists, and it is therefore necessary that the following instructions be thoroughly understood and adhered to by all concerned; particular attention is drawn to the detailed description which is shown against each service order with a view to assisting you in quoting the correct order number to all work carried out under the above heading. Should, however, any doubt exist as to the correct service order number to be used, kindly take the matter up with the cost accountant, who will give any further explanation necessary.

Work Done on a Service Order the Estimated Cost of which WILL NOT EXCEED 5/– (Five Shillings) in Value

Materials for this purpose will not require an official works instruction sheet, but can simply be drawn from stock on a blue stores requisition. The exact purpose for which the material is required for the department where it is going to be used must be stated.

All stores requisitions must be signed by a foreman in reference to works matters, or otherwise by a departmental head.

Labour will be booked to the same service order number on which the above material is drawn.

Work Done on a Service Order No. the Estimated Cost of which WILL EXCEED 5/– (Five Shillings) in Value

An official works instruction sheet must first be obtained from the Planning Department, and on this will be quoted a service order number.

Applications for works instruction sheets must be made out by—

1. For work to be done for any *Works* Department.	The foreman of the department concerned.
2. For work required to be done for commercial departments.	By the departmental head.

The special duplicate books are provided for this purpose, and full description of the work must be stated. These applications will then be sent to—

(*See above.*) 1. The works manager, who will initial same as authority for the work to be put in hand.

(*See above.*) 2. The commercial manager, who will initial same as authority for the work to be put in hand.

Applications will then be passed on to the Planning Department for issue of works instruction sheet as mentioned above.

Materials required for carrying out the work mentioned must be drawn from stores on a coloured stores requisition (blue), *quoting the Order No. and signed by the foreman.*

Labour must also be booked to the same service order number on which materials are drawn.

CAPITAL EXPENDITURE (Additions)

<table>
<tr><th>Example of numbering Service Orders.</th><th colspan="2">Classification and Description of Assets.</th><th>Example of numbering Service Orders.</th></tr>
<tr><td></td><td colspan="2">POWER PLANT.
(A distinction is usually desirable between plant and machinery to facilitate the collection of the various expense items as between the respective departments. The Service Orders relating to plant will therefore include all motive power plant such as electric motors, gas and steam engines, heating plant, gas producing plant, and the like, and the term " Machinery " will include producing machinery only.)
The subdivision of the Service Orders relating to plant assets will usually depend upon the extent of the equipment, as one concern may only require a number of electric motors whereas others may generate their own electrical energy as well as gas and compressed air, etc.</td><td></td></tr>
<tr><td></td><td>With the small concern the Service Orders may suitably be analysed as follows—</td><td>With those concerns who generate their own power the main subdivision of the Service Orders relating to plant may take the following form, and each main division being again subdivided according to the size and requirements of the business—</td><td></td></tr>
<tr><td>S.O. 10</td><td>Motive Power Plant to include all electric motors, gas engines, steam engines, etc.</td><td>Steam Raising Plant, which will include boilers, stokers, economizers, water softening plant, etc. This plant item may be further analysed as follows—
Boilers (A1–1*a*), Stokers (A1–1*b*), Economizers (A1–1*c*), Water Softening Plant (A1–1*d*), etc.</td><td>A1–1</td></tr>
<tr><td></td><td></td><td>Steam Distribution Plant, to include all piping, valves, etc.</td><td>A1–2</td></tr>
<tr><td></td><td></td><td>Electricity Generating Plant, comprising steam turbines or engines, generators, switchgear, etc.</td><td>A2–1</td></tr>
<tr><td></td><td></td><td>Electricity Distribution Plant to include transformers, cables, switches, etc. For further subdivision *see* Service Orders A5–1 and A5–2</td><td>A2–2</td></tr>
<tr><td></td><td></td><td>Compressed Air Plant</td><td>A3–1</td></tr>
<tr><td></td><td></td><td>Gas Producing Plant</td><td>A4–1</td></tr>
</table>

CAPITAL EXPENDITURE (Additions)—(*contd.*)

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
S.O. 11	TRANSMISSION PLANT. When a separate Service Order is allocated to the transmission system the one account may be sufficient for most purposes, and in this instance will include main shafting, switches, cables, etc. (Countershafting may also be included here, but it is usually found more desirable to allocate this item to " Machinery.") With all but very small factories the Service Orders relating to transmission plant should be departmentalized whenever possible, and the department's symbol or letter quoted against the Service Order number. If, therefore, work is being done in, say, E. Dept. the Service Order number would be given as S.O. 11 E.	With large concerns the transmission plant may firstly require to be subdivided as to class, and secondly by departments. The subdivision into the various forms of transmission may be as follows—	
		ELECTRICAL TRANSMISSION (POWER). Which will include cables, switches, etc., of the power supply only.	A5–1
		ELECTRICAL TRANSMISSION (LIGHTING). To include cables, switches, fittings, wiring, arc lamps, rosettes, guards, extension cords, etc.	A5–2
		MECHANICAL TRANSMISSION (POWER). Comprising line shafting, pulleys, spur gearing, chain drives, etc. Countershafting, belts, and ropes should not be included here, as it will be found more useful to regard countershafting as part of the equipment of the respective machine tools.	A5–3
S.O. 12	CONVEYORS, CRANES, & HOISTS. The small amount of this class of plant used by some concerns will usually be such that the one Service Order is sufficient for most cases. If the expense relating to material handling, however, is recovered separately in costs from the general shop expenses, then it may be desirable to analyse accordingly so that the amount of depreciation, etc., to be charged to material handling can be correctly ascertained.	The extent of the equipment used will decide the amount of analysis required with this item. When separate plant is used for material handling, etc., as distinct from the use of, say, conveyors in each department of the factory, the subdivision into three accounts may be sufficient. The amount of plant used by each department will vary to a considerable extent, and each of the following accounts should therefore be analysed to departments.—	
		CRANES intended to include all travelling and stationary cranes, lifting tackle, etc.	A6–1
		HOISTS to include all lifts which may form part of the permanent buildings, etc.	A6–2
		CONVEYORS, including automatic conveyors, shoots, slipways, etc.	A6–3

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
S.O. 13	SPECIAL PLANT. Most concerns require special kinds of plant, which can only be classified as such owing to their great variety. This class of plant may, therefore, include case hardening, baking and drying ovens, smithy, etc.	When a great variety of sundry items of plant are in use, separate Service Orders should be allocated accordingly, as it will usually be necessary to analyse the expense incurred for the purpose of costing the work done by each class of plant, as, for instance, when case hardening costs are figured by the process method of cost finding. The further allocation of Service Orders will naturally depend upon the various kinds of plant used, e.g.—	
		Case Hardening Plant	A7–1
		Coslettizing Plant	A7–2
		Drying Ovens	A7–3
		Smithy	A7–4
S.O. 14	MACHINERY, FIXED. To include all producing machinery and countershafting only, but exclusive of loose tools, equipment, and belting, etc. When it is desired to obtain a record of each piece of machinery, numbers should be allocated to and fixed on each machine. The number is then quoted when work is done on any machine.	The analysis of the Service Orders relating to fixed machinery will partly depend upon the extent of the equipment and partly the method used for recovering factory expenses in costs. For instance, when a separate machine rate is used for each machine tool or group rates for each class of machine tools, the analysis should have regard to this form of classification as well as that of departments; in other words, the analysis may firstly proceed by departments, and secondly, according to the class of machinery in use, alternatively, firstly by class and secondly by departments; assuming the former, the Service Orders may be allocated as follows—	
		Heavy Machine Shop— Milling Machines	A8–1
		Planing Machines	A8–2
		Boring Mills	A8–3
		Grinding Machines, Etc.	A8–4
		Light Machine Shop—Lathes (Engine)	A8–5
		Lathes (Capstans)	A8–6
		Drills	A8–7
		Woodworking Shop— Circular Saws	A8–8
		Band Saws	A8–9
		Mortising Machines	A8–10
		Moulding Machines	A8–11

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
S.O. 15	MACHINERY, LOOSE. Comprising all loose equipment supplied with each machine tool, bench drills, etc., i.e. such machinery as is not a permanent fixture, as distinct from loose tools.	The necessity of allocating separate Service Orders to loose machinery will invariably arise with very large concerns, as the amount of capital expended upon this item will usually be found out of proportion to the value of fixed machinery if proper control is not exercised. The various types of loose machinery should therefore be classified and Service Orders allocated to each class similar to the following—	
		Heavy Machine Shop—Pneumatic Drills	A9–1
		Fitting Shop—Bench Drills, Etc	A9–2
S.O. 16	BUILDINGS AND LAND. This Service Order will also include roads and fences, etc., in addition to the cost of each building. When the factory premises are fairly large and consist of more than one building, symbols or letters should be given each building, and a separate Service Order allocated. The cost of special foundations for machine tools are sometimes charged to this account as forming part of the building, and when this method is adopted, care must be taken to see that the book values are adjusted when special foundations become useless owing to the removal or re-arrangement of any machinery. When a machine is moved and new foundations are required, it is usually the practice to charge the cost of new foundations to the repairs and maintenance of buildings.	The subdivision of Service Orders relating to buildings and land will depend upon the size and location of the premises. If, therefore, the *Works* comprise several buildings which are situated either in the one or different localities, the subdivision would naturally be allocated to each building, but in those cases where the works comprise only one building the main Service Order may be further analysed to departments, alternatively, the cost of new buildings can be analysed to show the expenditure on the following lines— *Buildings*—	
		General Masonry Work may be further analysed as walls, floors. roof, plastering, etc., if desired.	A10–1
		Wood Work, which includes all doors, windows, roofing, flooring, etc.	A10–2
		Metal Work, including metal doors, windows, iron railings, gutters, girders, trusses, etc.	A10–3
		Plumbing, to include water, gas, and sewer connections, etc.	A10–4
		Land—Roads	A11–1
		Fences, Etc.	A11–2

Capital Expenditure (Additions)—(*contd.*)

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
S.O. 17	FIXTURES AND FITTINGS WORKS., To include all partitions, benches, bins, racks, desks, foremen's offices, etc. In some instances there may be included with this Service Order telephone fittings, lighting fittings, etc., when not separately classified.	With large concerns, fixtures and fittings may be classified as permanent fixtures and loose fixtures. Permanent fixtures would therefore include such items as partitions, etc., which form part of the main building and loose fixtures will comprise work tables, desks, and benches when not forming part of main building or structure, etc.	
		Works Fixtures and Fittings, Loose	A12-1
		Works Fixtures and Fittings, Fixed	A12-2
		The sub-analysis of the above item will differ with almost each factory, as lighting fittings and telephone fittings may be included here if Service Orders are not allocated to the two latter accounts.	
S.O. 18	FIXTURES AND FITTINGS, OFFICE. Intended to include only those items which relate to the office departments as distinct from the factory	Office Fixtures and Fittings, Loose	A13-1
		Office Fixtures and Fittings, Fixed	A13-2
S.O. 19	TOOLS. To include all bench tools, chucks, vices, jigs, gauges, etc., and special tools for general purposes. The subdivision of this class of Service Orders will entirely depend upon the nature of the industry and extent of tool equipment. The division into perishable tools and permanent tools will, however, generally meet most cases.	The extent and nature of the tool equipment will decide the amount of analysis necessary for tools. Service Orders may therefore be allocated to perishable tools and permanent tools alternatively, the division made on the following or similar lines—	
		Tools, to include chucks, faceplates, vices, and special tools for general purposes.	A14-1
		Tools, to include twist drills and taps (above $\frac{3}{8}$ in. diameter), reamers, milling cutters, etc.	A14-2
		Tools, to include taps and small drills (under $\frac{3}{8}$ in. diameter), hammers, files, screw-drivers, and other perishable tools.	A14-3
		(Special tools may also be analysed according to the products for which they are required.)	
S.O. 20	PATTERNS. Intended to include all new patterns made for general production. This Service Order will not include special patterns made to customers' orders.	The expense of new patterns may be analysed to show the amount incurred by each class of product or divided into two main groups, i.e.—	
		Wood Patterns	A15-1
		Metal Patterns	A15-2

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
	The expenses incurred in reference to the repair and maintenance of each class of "Assets" will be collected by means of the Service Orders allocated to each class. To facilitate the control of these items it may be desirable that special plant repair orders be used for all work to be done over a certain amount, as this procedure will ensure that all repair jobs be brought to the attention of some responsible official for sanction. The analysis of the repairs and maintenance expense and the allocation of Service Orders will follow on similar lines to that described for capital expenditure above, and as a description has already been given of the various items which are covered by each of these Service Orders, only the additional information necessary is stated below.		
S.O. 50	MOTIVE POWER PLANT.	*Power Plant.*	
		Steam Raising Plant. If further analysed as described for "Capital Additions," the Service Orders may be allocated as follows— Boilers (M1–1*a*), Stokers (M1–1*b*), Economizers (M1–1*c*), Water Softening Plant (M1–1*d*), etc.	M1–1
		Steam Distribution Plant	M1–2
		Electricity Generating Plant	M2–1
		Electricity Distribution Plant	M2–2
		Compressed Air Plant	M3–1
		Gas Producing Plant	M4–1
S.O. 51	TRANSMISSION PLANT.		
		Electrical Transmission, Power	M5–1
		Electrical Transmission, Lighting	M5–2
		Mechanical Transmission, Power	M5–3
S.O. 52	CONVEYORS, CRANES, AND HOISTS.		
		Cranes	M6–1
		Hoists	M6–2
		Conveyors	M6–3
S.O. 53	SPECIAL PLANT.		
		Case Hardening Plant	M7–1
		Coslettizing Plant	M7–2
		Drying Ovens	M7–3
		Smithy	M7–4

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
S.O. 54	MACHINERY, FIXED. The machine number must be quoted on all time cards and stores requisitions, etc.	*Heavy Machine Shop*—Milling Machines	M8–1
		Planing Machines	M8–2
		Boring Mills	M8–3
		Grinding Machines	M8–4
		Light Machine Shop—Lathes (Engine)	M8–5
		Lathes (Capstans)	M8–6
		Drilling Machines	M8–7
		Woodworking Shop—Circular Saws	M8–8
		Band Saws	M8–9
		Mortising Machines	M8–10
		Moulding Machines	M8–11
S.O. 55	MACHINERY, LOOSE.	*Heavy Machine Shop*—Pneumatic Drills	M9–1
		Light Machine Shop—Bench Drills, Etc.	M9–2
S.O. 56	BUILDINGS AND LAND. Intended to include pointing and painting, etc., to existing buildings only, as distinct from wood partitions, racks, and movable fixtures on S.O. 57, S.O.58; departmental symbols or letters to be quoted on time cards and stores requisitions in each case.	*Buildings*—General Masonry Work	M10–1
		Woodwork	M10–2
		Metal Work	M10–3
		Plumbing	M10–4
		Land—Roads	M11–1
		Fences, Etc.	M11–2
S.O. 57	FIXTURES AND FITTINGS, WORKS.	Works Fixtures and Fittings, Loose	M12–1
		Works Fixtures and Fittings, Fixed	M12–2
S.O. 58	FIXTURES AND FITTINGS, OFFICES.	Office Fixtures and Fittings, Loose	M12–3
		Office Fixtures and Fittings, Fixed	M12–4
S.O. 59	TOOLS.	Tools. Chucks, face plates, vices, and special tools for general production purposes.	M13–1
		Tools. Twist drills and taps (above $\frac{3}{8}$ in. diameter), reamers, milling cutters, etc.	M13–2
S.O. 60	PATTERNS. To include renovation of existing patterns used for general production purposes. This must not include repairs to special patterns made against customers' orders.	Wood Patterns	M14–1
		Metal Patterns	M14–2

RE-ARRANGEMENT AND ALTERATIONS

Example of numbering Service Orders.	Classification and Description of Assets.	Example of numbering Service Orders.
	The expense of re-arranging and altering existing plant is collected by means of Service Orders, and the numbers allocated to this class of expense will be very similar to repairs and maintenance, excepting that certain of those items will not be included.	
S.O. 100	MOTIVE POWER PLANT.	
	Power Plant—	
	Steam Raising Plant	R1–1
	Steam Distributing Plant	R1–2
	Electricity Generating Plant	R2–1
	Electricity Distribution Plant	R2–2
	Compressed Air Plant	R3–1
	Gas Producing Plant	R4–1
S.O. 101	TRANSMISSION PLANT.	
	Electrical Transmission, Power	R5–1
	Electrical Transmisson, Lighting	R5–2
	Mechanical Transmission, Power	R5–3
S.O. 102	CONVEYORS, CRANES, AND HOISTS.	
	Cranes	R6–1
	Hoists	R6–2
	Conveyors	R6–3
S.O. 103	SPECIAL PLANT.	
	Case Hardening Plant	R7–1
	Coslettizing Plant	R7–2
	Drying Ovens	R7–3
	Smithy	R7–4
S.O. 104	MACHINERY, FIXED.	
	Heavy Machine Shop—Milling Machines	R8–1
	Planing Machines	R8–2
	Boring Machines	R8–3
	Grinding Machines	R8–4
	Light Machine Shop—Lathes (Engine)	R8–5
	Lathes (Capstan)	R8–6
	Drilling Machines	R8–7
	Woodworking Shop—Circular Saws	R8–8
	Band Saws	R8–9
	Mortising Machines	R8–10
	Moulding Machines	R8–11

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
S.O. 105	BUILDINGS AND LAND.		
		Buildings—General Masonry Work	R10–1
		Wood Work	R10–2
		Metal Work	R10–3
		Plumbing	R10–4
		Land—Roads	R11–1
		Fences, Etc.	R11–2
S.O. 106	FIXTURES AND FITTINGS, WORKS.		
		Works Fixtures and Fittings, Loose	R12–1
		Works Fixtures and Fittings, Fixed	R12–2
S.O. 107	FIXTURES AND FITTINGS, OFFICES.		
		Offices Fixtures and Fittings, Loose	R12–3
		Offices Fixtures and Fittings, Fixed	R12–4

GENERAL SHOP EXPENSE

The undermentioned Service Orders are intended to cover all general shop expenses which require analysing either to departments or processes. The extent of this class of orders and the amount of analysis required will depend upon the special conditions of each factory and the nature of trade carried on, therefore a few items are given by way of illustration only and to demonstrate the main object of analysing and collecting the sundry factory expenses by means of Service Orders. Many other orders will require to be used, but the undermentioned will be sufficient to indicate their general nature.

INDIRECT LABOUR.

Intended to give an analysis of all indirect labour. This Service Order may be arranged to give an analysis either by departments or by the nature of the work performed. With some concerns the departmental analysis may be as follows—

The allocation of Service Orders in the case of large concerns will usually follow the nature of the indirect work performed and to further divide each order to obtain a departmental analysis similar to the following—

S.O. 201	Stores and Receiving Department. Includes wages of all assistants other than salaried officials.	Supervision—Department X	G1–*X*
		Department Y	G1–*Y*
		Department Z	G1–*Z*
		To include wages of foremen, etc., and assistants, but exclusive of salaried officials.	

GENERAL SHOP EXPENSE—(*contd.*)

Example of numbering Service Orders.	CLASSIFICATION AND DESCRIPTION OF ASSETS.		Example of numbering Service Orders.
S.O. 202	POWER DEPARTMENT	INSPECTION AND VIEWING—Department X	G1–2*X*
S.O. 203	REPAIR DEPARTMENT	Department Y	G1–2*Y*
		Department Z	G1–2*Z*
		Includes wages of inspectors, etc., and assistants.	
S.O. 204	DESPATCH DEPARTMENT	CLEANING AND SWEEPING—Department X	G1–3*X*
S.O. 205	TOOL STORES	Department Y	G1–3*Y*
		Department Z	G1–3*Z*
S.O. 206	GENERAL SHOP LABOURING	SHOP CLERKS—Department X	G1–4*X*
		Department Y	G1–4*Y*
		Department Z	G1–4*Z*
		OILING AND CLEANING MACHINES—Department X	G1–5*X*
		Department Y	G1–5*Y*
		Department Z	G1–5*Z*
		Intended to include time of direct workers when engaged in oiling and cleaning machine tools, etc.	
		UNALLOCATED TIME—Department X	G1–6*X*
		Department Y	G1–6*Y*
		Department Z	G1–6*Z*
		This account will require to be further analysed to show the cause, i.e.—	
		Waiting for Materials—Department X	G1–61*X*
		Department Y	G1–61*Y*
		Department Z	G1–61*Z*
		Belt Breakdown—Department X	G1–62*X*
		Department Y	G1–62*Y*
		Department Z	G1–62*Z*
		Etc.	
		GENERAL LABOURING—Department X	G1–7*X*
		Department Y	G1–7*Y*
		Department Z	G1–7*Z*
		HANDLING MATERIALS—Department X	G1–8*X*
		Department Y	G1–8*Y*
		Department Z	G1–8*Z*
		Intended to include the moving and trucking of materials in each department.	

MISCELLANEOUS

Example of numbering Service Orders.	Classification and Description of Assets.		Example of numbering Service Orders.
	LIGHT, HEAT, AND POWER. Intended for use when all power is purchased from outside.	MISCELLANEOUS TRANSPORTS. The Service Orders under this heading are intended to include all charges relating to motor vans and horse-drawn vehicles, etc., and the extent of the analysis will depend upon the size of the "service," and whether the transports are engaged in carting raw materials only or both incoming and outgoing materials. In the latter case the expense is collected so that the Sales Department are charged with their correct proportion. In the case of motor vans, Service Orders may be allocated as follows—	
S.O. 207	Electricity	Drivers' and Assistants' Wages (Analysed to each van)	S2–1
S.O. 208	Gas	Repairs and Renewals (Analysed to each van)	S2–2
S.O. 209	Water	Cleaning, Etc. (Analysed to each van)	S2–3
S.O. 210	Fuel	Petrol Consumed (Analysed to each van)	S2–4
S.O. 211	GENERAL PURPOSES. Intended to include oil, rags, waste, emery paper, etc., and all such items required by the factory departments. Metal of any description must not be drawn from stock on this Service Order.	With those concerns where the quantity of sundry materials consumed by each department is large, this order should be analysed so that the amount used by each department is obtained.	
		Department X	S3–1*x*
		Department Y	S3–1*y*
		Department Z	S3–1*z*

MISCELLANEOUS (*contd.*)

Example of numbering Service Orders.	CLASSIFICATION AND DESCRIPTION OF ASSETS.		Example of numbering Service Orders.
S.O. 212	WELFARE AND CANTEEN EXPENSES. Intended to include all expenses in connection with welfare sports, etc., also of canteen, but exclusive of general repairs and maintenance of canteen buildings.	WELFARE The order may be analysed to show the amount of expenses as between the male and female employees also apprentices or according to the various forms of welfare provided.	S4-1
		CANTEEN EXPENSES Intended to cover any work done by the company's employees other than "additions" or expenses incurred, such as payment of wages to canteen staff, etc.	S5-1
S.O. 213	COMPLAINTS. To include all expenditure in regard to rectifying, repairing, or altering of the company's products which have been returned by a customer due to faulty workmanship and/or materials or design, damage in transit, etc. Any work in this direction should be done on a special repairs order, and the time cards and stores requisitions will quote the number of the repair order.	The analysis of this class of Service Orders will be guided by the nature of industry, for instance, if the products are standardized, the main division may be arranged according to the class of products, and each class subdivided to show the cause of the error, such as—	
		Losses due to faulty design	S6–1
		Losses due to faulty materials	S6–2
		Losses due to faulty workmanship, etc.	S6–3
		In those cases where non-standard articles are made, the analysis may be arranged to show the loss under the above headings or by departments.	
S.O. 214	EXPERIMENTAL. To include all expenditure incurred in regard to experimental or development work carried out in connection with the company's products.	With large concerns this class of service will require to be analysed so that the cost incurred by each product, etc., is ascertained separately.	
		EXHIBITION EXPENSES Intended to include all expenses incurred in this direction, such as labour and materials used in erecting stands, wiring, carriage on exhibits, etc. analysed according to requirements.	S7-1

SHRINKAGE IN STORES. (See STORES LOSSES AND SHRINKAGE.)

SHOP COST. (See FACTORY COST.)

SINGLE OR OUTPUT COSTING. A term often used when referring to the method of costing employed in such businesses as supply one rather than many products, and where it is desirable to find the actual or average cost of one unit, weight, measurement or container, such as per ton, per yard, per 1,000 bricks, per barrel or a sack of flour. For the purpose of explaining the principles of this method of costing a description of the coal mining system is chosen.

Coal Mining Costs. In any system of cost accounting for this industry the following considerations have to be borne in mind before proceeding with the first development operation, namely, the sinking of the shaft—

1. That development, equipment, and plant are a first expenditure before coal mining can commence and are, therefore, a capital cost.

2. That this cost is not a permanent asset, as it depreciates as the coal is won and must, therefore, be provided for by

Form No. 86.

CONSTRUCTION OF SHAFT..............................feet deep

For the..................................Colliery Company.

COST for.....................ending.....................................192............
..............................feet excavated.

	Per Foot of Depth.	Per Cubic Yard.
Sinker and his men		
Blacksmiths and fitters		
Boilerman, enginemen, and labourers		
Superintendence—		
Concreting : Material and labour		
Stores, timber, etc.		
Repairs		
Coal and power		
Insurance and depreciation		
Office and administration expenses		
Total cost per foot and cubic yard		

being included in the cost of operating. This provision is made by dividing the capital cost by the estimated tonnage underground, which gives a rate per ton necessary to redeem this cost.

3. That capital cost ceases after the mine has been developed and equipped, and operating charges commence when coal is being won.

4. That additions and improvements after a period of time should be capitalized and recovered in costs as a charge on the estimated tonnage of coal remaining underground as 2 above.

5. That ordinary repairs and replacements are an operating expense.

When shaft sinking is proceeding, care must be taken that the estimated costs are not being exceeded. Weekly costs should, therefore, be made up showing labour, stores, and material expended, and depth of shaft sunk during the week. This will vary with the conditions met with, and on page 311 is given a specimen account which shows the ordinary items occurring in shaft sinking.

Output of Coal. When operations have commenced all coal brought to bank should be weighed, averaged, and totals sent to the wages office, as the weight is the basis of the Wages Book entry.

Wages Bill. Wages are made up from the particulars supplied of the weight of coal brought to bank, and from the timekeeping particulars relating to men employed on an hourly basis. The sheets should provide for all necessary information, and have columns to show all the off-takes. Separate wage sheets should be used for production wages, and maintenance wages to get the actual cost of these groups. Where a man has been working in different parts of the pit, the total amount of wages due to him should be brought together in the sheets by a transfer column, which will allow the totals to balance.

When the pay sheets are completed the total amount payable is divided into the weekly output of disposable coal and a wages pit head cost found ; a summary should then be made up and sent to head office for the purpose of issuing the wages cheque, the wages, of course, being paid by a staff sent from head office.

Stores. When a mine has reached its full operating capacity it is a big consumer of stores and materials, which are subject to destructive wear and tear by reason of the heavy work they

Form No 87

WEEKLY RETURN

For Week Ending........................ 192 . .

Period.	Coal Produced.	Coal Disposed of.	Coal to Locos. and Boilers.	Miners' Coal.	Unsaleable Coal.	Fireclay.
This Week . . .						
Last Week . . .						
This Year to Date . .						

Period.	Employees.				Av. Coal per Day.		Av. Wage per Day.	
	On Books.	Absent.	Per Cent. Absent.	Days Worked.	Per Tub.	Per Man.	Under-ground.	Surface.
This Week . . .								
Last Week . . .								
This Year to Date . .								

are called upon to perform. Furthermore, all the equipment and plant must be kept in good repair to maintain the necessary output for the successful working of the concern.

As the workings advance and the length of haulage increases, more tracks have to be laid and maintained, tubs wear out and have to be replaced, roads must be timbered—all an increasing expense, which has to be met. In time a period will arrive when very heavy expenditure must be incurred by the replacement of equipment, which cannot obviously be charged against the cost of obtaining the coal in the period in which this expense is incurred. An estimate of the life of the equipment should, therefore, be made and the cost spread over this period and a weekly or monthly charge made to the cost of coal produced.

A proper method of handling stores should, therefore, be in existence, minimum and maximum quantities fixed, and no stores issued without a stores requisition signed by a responsible official. To afford a check upon the Stores Department bin cards should be provided, and stock record cards kept by the Cost Department, so that comparisons can be made periodically.

Bulky and heavy items of stores, such as rails, timber, etc., which cannot easily be taken into the stores, are generally stacked around the pit mouth. They should, therefore, be treated in a similar manner to the other and less bulky items, and nothing allowed to go down the shaft unless a stores requisition is produced.

With regard to old pit props, rails and tracks, etc., it should be the duty of an official to see that all of these items are brought to bank to be disposed of as scrap, as there may be a very heavy loss in this direction if discarded plant and material are allowed to remain in the mine.

The consumption of stores in a colliery being of a very wasteful character, comparisons should be made week by week and any increase questioned.

Steam and Power. Steam and power are an expense which is difficult to allocate, and care should be taken to see that the allocation is as near as possible, and that a fair price is charged to this department for the coal used. The layout of the plant of any colliery will depend on the available land, but care should be taken that steam is not carried too far a distance from the boilers to the plant needing it, as there is always a tendency for uncontrollable waste to occur when carrying steam any distance through pipes.

Form No. 88.

COMPARATIVE TONNAGE STATEMENT

FOR MONTH OF..192........

DISPOSAL OF COAL.	CURRENT MONTH.				THIS YEAR TO DATE.			
	Screened.	Nuts.	Etc.	Total.	Screened.	Nuts.	Etc.	Total.
Shipping coal . .								
Landsale coal . .								
Locomotive coal . .								
Boiler								
Miners								
Coal to washery . .								
Miscellaneous . .								
TOTAL . .								
Add— Coal in stock and in wagons at beginning of month . . .								
TOTAL . .								
Less— Coal in stock in wagons at end of month .								
Production of coal for month and year . .								

The coal consumed by the boiler house is naturally the produce of the mine, and the quantity often used is unsaleable, and for this reason is sometimes not charged to costs. This practice is obviously wrong, because if the coal was not available, better coal would be used or other coal purchased. The coal which cannot be sold should be charged to the boilers at the cost of production based upon the average cost of the preceding month. On the other hand, if saleable coal is used, it should be charged at cost or market price, whichever is lower.

Coal at a colliery is naturally plentiful and easy of access. There is a tendency, therefore, to waste coal by burning it under uneconomical conditions and by bad firing of the boilers, and the result is an excessive cost of generating steam.

Electrical energy is now generally used in the mining industry, and may be either generated at the colliery or purchased from an electric supply company. In such cases the allocation of electrical energy is not as difficult as with steam. If meters are installed about the mine, the transmission of power to the pumping gear, haulage gear, screens, washery, ventilating, fans, etc., can be checked at frequent periods, and the actual consumption of electricity by each section of the plant ascertained and charged to it in the weekly costs. If electrical cutters are used in the mine, the energy consumed should be charged as an underground cost and not as a mine overhead expense.

Other Colliery Costs. The remaining expenses chargeable to production are timber, haulage, ventilation, screening, washing, ponies, mine office expense and management, together with expenses incidental to coal getting. These expenses should be shown separately on the cost sheet, together with the cost of stores, welfare, levies, and the provision made for surface damage or subsidence.

Final Items in Coal Mining Costs. After a pit head cost has been arrived at there will be other items that go to make up the total cost figure ; these are depreciation, depletion, obsolescence, insurance, compensation, general charges, rent and rates, selling expenses, and contingent reserves. These items are better treated by making a monthly cost return, and arrangements should be made for the transfer from weekly to monthly costs, which should be planned to fit in with the financial accounts at head office.

Statistics. The coal industry lends itself very well to the compilation of statistics relating to the cost per ton of coal

Form No. 89.

COST OF COAL PRODUCTION AT PIT HEAD

DESCRIPTION.	CURRENT WEEK.		THIS YEAR TO DATE.		Percentage.
	Amount.	Cost per Ton.	Amount.	Cost per Ton.	
Underground labour					
Surface labour					
Engineers and mechanics					
Timber					
Stores and materials					
Electricity					
Boiler coal					
Horse keep					
Health and unemployment insurance					
Royalties					
Welfare levies					
Maintenance reserve					
Surface damages					
Supervision and mine office expenses					
Sundries					
TOTAL					

produced, and every opportunity should be taken of placing before the management statistical matter relating to coal produced, coal sold, shipped, and the comparative costs of maintenance, power, sales, etc., for any given period.

Form No. 90.

COST OF SALES AND INCOME ACCOUNT

FOR MONTH OF.................................192....

	CURRENT MONTH.				THIS YEAR TO DATE.			
	£	*s.*	*d.*	Average per Ton.	£	*s.*	*d.*	Average per Ton.
Sales—								
Shipping coal . .								
Landsale coal . .								
Locomotive coal .								
Boiler coal . .								
Miners' coal . .								
Coal to washery. .								
Miscellaneous . .								
Gross sales (coal produced)								
Less—								
Railway leadage .								
Wagon hire . .								
Commissions . .								
Wayleaves . .								
Other surface royalties								
Total deductions . .								
Net receipts for coal at mine . . .								
Less total of operating and selling costs .								
Net profit on coal . .								
Add—								
Sundry income . .								
Brickworks . .								
Dwelling houses .								
Washery, etc. . .								
Total income for month and year to date .								

SPECIFICATION OF MATERIALS. (See Bill of Material.)

SPOILAGE LOSS. (See Defective Work—Cost of, also Stores Losses and Shrinkage.)

STANDARD COSTING. A method of predetermining costs and the comparison of the actual with the estimated costs during process of manufacture. Standard costing is often referred to as " predetermined costing " and in some cases as " budgetary control."

Fundamentally there are two different methods of costing. The first is to ascertain the cost of an article, order, or process *after* the work is finished, the second is to ascertain the cost *before* the work is commenced with the object of " controlling " expenditure during the period the work is in progress. The former method is attained by adopting one or a combination of the various methods of cost finding, described on page 93, and although of long date is still used by the majority of manufacturers. The latter method, however, is more modern, and is now generally in operation among a few of the large and well-organized concerns, where more constructive cost data is needed, which cannot be obtained by the use of the older method.

A standard cost is a predetermined cost based upon the presence of a given set of conditions, and the application of this method is accomplished in the comparison of the actual with the standard, which may be done in the aggregate, or by process, product or department. Standard costs may, therefore, be figured for specific operations such as plating, lacquering or refining, or for the manufacture of individual articles such as screws, nuts and bolts, ingots, castings, boots and shoes, etc., and for the generation of electricity, steam or compressed air, etc.

The question of comparison as referred to with standard costing is a very different thing to comparing the actual job costs singly with the estimates. With standard costs a comparison of detailed operations is made on the exception principle, and the great advantage of this method is that *tendencies* are disclosed, thus enabling the policy of a business to be determined rapidly and with greater precision than is possible with the older method of costing.

When standards are being set, which should be done on the basis of the factory operating at its full normal output capacity, and at a reasonable rate of efficiency, a basis of measurement or unit of output must firstly be agreed, and here one of the advantages of a computed standard cost becomes apparent. It conveys far more to the directors that their cost is represented by 140 for June, 138 for July, and by 141 for August than to be informed that the cost for June was 92 per cent of the corresponding cost of last year, for July 88 per cent, and for August 95½ per cent of August last year.

Standard labour costs, which are the costs of the standard time required to perform the operation, may be set up on the basis of past cost records, provided that the conditions under which they were obtained are recorded. On the other hand, they may have to be modified to suit new or anticipated conditions. Where piece work, premium or bonus methods of remunerating labour are in use, these may be taken as standards.

Standard material costs are more easily established than labour costs, as past records usually exist which are very reliable, both as to quantity and price.

The fixing of standard expense rates is comparatively easy, and the first step in this direction is to estimate the standard direct hours or total direct labour on the basis of the factory working at its full normal maximum output capacity and at a reasonable rate of efficiency. With such a figure as the basis a standard is set for all items of expense, but for the convenience of control all expenses are grouped, firstly, according to fixed and variable items, and secondly, by class, i.e. indirect materials, indirect labour, depreciation, rates, taxes and insurance, power, light and heat, etc. Such grouping, however, will be determined by the nature and size of industry which is being carried on.

When a production or works order is issued to the factory the standards for labour, materials, and expenses are stated, so that the managers of the respective producing departments are informed of the maximum amount and quantities allowed on each operation or piece. The actual cost of each operation or piece can, therefore, be compared with the standard and the reason for any excessive costs shown. By this means preventable losses can be reduced to a minimum, or entirely eliminated *whilst the work is in progress*.

The final cost of a particular job, order or operation is only compiled for those orders which do not come within the predetermined limits, and the total of such costs indicates the exact amount of expense incurred by inefficient working.

On the completion of each cost period, which may be weekly or monthly, efficiency statements are prepared. The number of statements and the amount of detail to be shown will vary with each factory, but the following list indicates the various kinds that are usually prepared. The separate statements may be compiled for individual articles, by class of product, or for each department.

1. **Variations in Factory Cost**—
   Direct Labour due to—
   - (*a*) Change in rates of pay.
   - (*b*) Efficiency of operations.
   - (*c*) Unallocated time (i.e. idle time).
   - (*d*) Other causes.

   Direct Materials due to—
   - (*a*) Change in price.
   - (*b*) Consumption.
   - (*c*) Spoilt work.

   Factory Expenses due to—
   - (*a*) Indirect labour—change in rates of pay.
   - (*b*) Indirect labour—unallocated time.
   - (*c*) Indirect materials—change in price.
   - (*d*) Indirect materials—quantity consumed.
   - (*e*) General shop expenses—suitably analysed, etc.

2. **Variations in Selling and Administrative Expenses**—
   Salaries due to (*a*) change in rates paid.
   (*b*) number employed.

3. **General Summary**—
   - (*a*) Actual cost of actual output.
   - (*b*) Standard cost of actual output.
   - (*c*) Standard cost of normal output.
   - (*d*) Increase or decrease of actual cost (*a*) to standard cost (*b*).
   - (*e*) Ratio of actual (*a*) to normal output (*c*).

The difference between 3 (*a*) and (*b*) is shown in 3 (*d*) and the details of this amount given in statement 1 above.

STANDING EXPENSES. (See CONSTANT EXPENSES.)

STANDING WORKS ORDERS. (See SERVICE ORDERS.)

STOCK APPROPRIATION. (See STOCK RECORD CARD.)

STOCK BALANCE CARD. (See STOCK RECORD CARD.)

STOCK CARD. (See STOCK RECORD CARD.)

STOCK CONTROL CARD. (See STOCK RECORD CARD.)

STOCK RECORD CARD. A record card generally kept by the Cost Department of all items of materials and goods in stock. A stock record card will serve a number of purposes, the chief of which may be given as—

1. It enables a perpetual inventory of all stores to be maintained of quantities.
2. Provides a basis of check upon the stores.
3. Facilitates the pricing of stores requisitions.
4. Greatly assists in the control of stocks.
5. Enables the purchasing of standard materials to be carried out with greater certainty and regularity.

Whether all or only a few of the above advantages will accrue to any firm depends upon the standard of efficiency attained in regard to the organization of the stores and production methods, and also the nature of the trade carried on. With some concerns, for instance, the small amount of materials stored or consumed may be such that an elementary form of material control is all that is necessary. A simple form of stock record will, therefore, be used and which may be ruled to show only receipts and issues of materials with the balance on hand. Such a stock record card is illustrated on page 330, and will be found very useful, as it provides information regarding the quantity of stock on hand and the means for pricing stores requisitions. With large concerns, however, a more detailed record may be required on account of the large quantities of materials consumed, and the necessity of providing suitable data on which to anticipate future requirements and the placing of orders. The ruling of the stock record card in such circumstances will vary with each concern, but in most instances there will be four essential items to be recorded, namely, (1) materials purchased, (2) balance in stock, (3) appropriations or required for orders, and (4) balance available.

A specimen stock record card, size 8 in. by 5 in., is shown from which it will be noted that the elementary type of perpetual inventory, referred to above, is represented by the " balance in stock " column, and that the remaining columns relate to the other information stated above.

The work of entering all receipts and issues, also quantities purchased, etc., is the same as described for the more simple form of card, illustrated on page 330, but the additional information in regard to appropriations, etc., will be made at the time the production order is issued to the factory. The object now being to reserve sufficient material for the particular order, the quantity is entered in the " appropriations "

Form No. 91.

STOCK RECORD CARD

Used for—		Description.					Bin No.
		Date					Dimensions—
Average Weight		Min.					
Per		Max.					

Purchased.					Issues.			Balance in Stock.	Appropriations.		
Date.	Order No.	Price.	Quantity.		Date.	Reqn. No.	Quantity		Order No.	Quantity	Balance Available
			Ordered.	Received							

(quantity) column and deducted from the "balance available" column.

The size and form of rulings for stock records will vary to a great extent, and the illustration on page 325 is a specimen record sheet, size 10 in. by 8 in., used by a Planning Department in place of the Cost Department. When such a department keep the stock records, they will price all stores requisitions before being passed on to the Cost Department.

The method of entering up the "record of material" form is briefly as shown on next page.

Particulars of all purchase orders placed are entered in columns 1, 2, 3, and 4. The quantity delivered and placed in stock is inserted in column 5 and added to the balance of columns 6 and 10. Issues of materials to the shops are entered in column 7 and deducted from column 6. Materials appropriation or reserved for orders are entered in column 8. This quantity is then deducted from the figure shown in column 10, and the difference which represents the balance available for future appropriation is then entered in column 10. In the event of insufficient materials being available, and as shown in column 10, the difference or "shorts" are inserted in column 9.

STOCK RECORD SHEET. (See Stock Record Card.)

STOREKEEPER—RESPONSIBILITIES AND DUTIES OF. The responsibilities and duties of a storekeeper will be onerous in a well-organized stores, and the necessity of employing a thoroughly capable storekeeper will be apparent. The operations of storekeeping may be regarded as commencing with the receipt of goods or materials, and his status may be likened to that of a cashier. He is responsible for the whole of the goods delivered to him, and this responsibility continues until he has issued them against authorized delivery notes or vouchers.

The duties of a storekeeper may, therefore, be briefly summarized as follows—

1. To accept only materials or goods into his store when accompanied by a written record stating the quantity and description of the various items, also a note of the purpose for which they are required, and to sign for their receipt from the Receiving Department. (See form of Inwards Goods Note, described on page 278.)
2. To keep all items of stock in their correct positions.
3. To keep the stores clean and tidy.

Form No. 92.

USED FOR—	**RECORD OF MATERIAL**		FILE UNDER—
STOCK CHECKED	DESCRIPTION.		
	Ordering Quan.		DIMENSIONS—
Average Weight per	,, Level		
Cost per	Urge Level		

1 Date.	2 Purchase Order No.	3 Price.	4 Quantity Purchased.	5 Quantity Received.	6 Balance in Stock.	7 Delivered to Shops.	8 Required for Orders.	9 Balance Required for Orders.	10 Balance Available.

(*Size of Sheet* 8″ wide × 10″ deep.)

4. To prevent any unauthorized person from entering the stores.

5. To issue materials against a written authority only, which should be properly and correctly made out.

6. To check all requisitions he receives, which have been issued against a bill of material, production order, or service order.

7. To check at frequent periods the quantity of goods contained in each bin, or rack, etc., with the quantity stated on the bin card.

8. To watch the stock levels and report—according to the recognized routine of replenishing stock—when the minimum is reached.

STORES BALANCES—VERIFICATION OF. (See RECORD OF BIN INSPECTION.)

STORES CONTROL ACCOUNTS. (See COST CONTROL ACCOUNTS, also STORES—FINANCIAL CONTROL OF.)

STORES CREDIT NOTE. Materials issued to the works for manufacturing purposes will sometimes consist of items that cannot be conveniently measured into the exact quantity that will be required for a particular operation or process, and in such cases it may be the practice to issue an item of material in bulk, such as a reel of copper wire, and on completion of the work the balance remaining is returned to the stores. The issue of the bulk supply is made against a stores requisition, and the total quantity credited to stock on both the bin cards and stock record cards. Upon the return of the balance the stores assistants weigh or count the quantity and make out a " stores credit note," which then forms the medium for crediting the job and debiting the stores.

Stores credit notes are, therefore, entered upon the bin card and stock record card as a " receipt," but as a " credit " to the job number or process from which the materials have been returned.

STORES DEPARTMENT—EXPENSES OF. The items which comprise the expenses of a Stores Department will vary with each business and may, therefore, include such expenses as salary of the stores superintendent or storekeeper and his assistants, wages of labourers engaged in moving materials, cost of any facilities, such as lifting tackle, etc., sundry supplies required by this department, also a portion of depreciation, etc., of buildings and fixtures, light and heat, etc., and in some cases the premiums paid on insurance of stocks against fire. (See FIRE INSURANCE.)

Form No. 93.

STORES CREDIT NOTE

3456

This Form is only to be used when Surplus Material is returned to Stores for Credit and not for Rejected Material or Parts.

From..Department to Main Stores. ....192........

Please receive the undermentioned material, being surplus on W/O......................

No. Off.	Weight.				Description.	Placed in Bin. No.	Price.		
	Cwt.	Qr.	Lb.	Oz.			£	s.	d.

Issuing Foreman to Sign Here.	Receiving Storekeeper to Sign Here.	Stock Cards.	Entered on Cost Sheet by	

The treatment of this expense item in the cost accounts will, firstly, depend upon whether a merchanting business is carried on in addition to manufacturing, and secondly, whether the expense incidental to the storing and handling of materials is recovered in costs separately from the factory expenses.

Merchanted Goods and Raw Material Stocks. In those cases where a merchanting business is also carried on and stocks are held of such items, it will be necessary to apportion the expenses of the Stores Department either on the basis of purchases made, or the value of the respective stocks held over a definite period.

The amount allocated to merchandise is a charge to the Selling Expense Account, whereas the amount relating to raw materials, etc., is a charge to the Factory Expense Account.

If items of merchandise are purchased and shipped direct to customers or redispatched the same day as received, the apportionment should be made on the basis of the value of stocks held and not on purchases.

When the expenses incidental to the storing and handling of materials are segregated from those which relate to production or manufacturing only, the total amount of stores expense is allocated to a " Material Handling Expense Account," and the item recovered in costs as a separate percentage to the factory expense and selling expense rates.

In those cases where a merchanting business is not carried on as described above, it is preferable that the expense of storekeeping be allocated to the factory expense and recovered in costs with the expenses of manufacturing, but if this method is not adopted the amount is charged to a Material Handling Expense Account, which is dealt with as a separate item to factory expenses.

STORES—FINANCIAL CONTROL AND PERPETUAL INVENTORIES. The importance of proper control in a stores cannot be over-estimated, especially where stocks are very large and run into many thousands of pounds in value. It is not uncommon to find, however, that laxity in the direction of stores supervision and control is still very pronounced. With some firms the annual or half-yearly stocktaking becomes nothing less than a time for making huge adjustments, much to the astonishment and annoyance of the management and officials generally. Furthermore, when stocks are proved to be hopelessly " out " it necessarily follows that most, if not all, of the costs furnished in the interim period are false, because the accuracy of cost accounts depends chiefly on true records in this direction. It is, therefore, quite evident that proper control becomes absolutely necessary.

The principles involved in purchasing and storekeeping have been dealt with under their respective headings, and consideration is now directed to the method of control of the stores as carried out by the Cost Department. A storekeeper is generally supplied with " bin cards " in order that a complete record can be made of all " receipts " and " issues." These cards automatically provide him with a detailed account of the whole of the materials under his charge. The Cost Department, on the other hand, should also keep a separate set of stock cards, the records on which are kept in such a manner that a complete and perpetual inventory of the stores is available at any desired date. These cards, or stock records, are in the majority of instances best dealt with in the Cost Department, owing to the fact that this department must be acquainted with all movements connected with materials and stock, as they will require copies of all stores requisitions, credit notes, etc., also particulars of prices of all materials, all of which are necessary for compiling job, process, or any other costs.

The ruling of a stock record card must be arranged to suit the requirements demanded by individual factories, but the following explanation embodies the essential principles that are applicable to most industries.

Under the heading of " purchasing " the routine in connection with the purchase order is explained, and the first copy of this form was described as being sent to the cost office for stock record purposes. Purchase orders should be dealt with immediately, and on receipt of the copy in the cost office a clerk will post particulars of the order on the stock record card, filling in details under the columns headed " purchased." The copy of the order is then initialled and returned to the Buying Department. The next step is in connection with the receipt of the goods and either a Goods Received Book or " inwards goods note " (see page 276) will be used as the medium of recording all items placed in stock. With the system described in connection with inwards goods notes the third copy is sent to the cost office by the buyer, so that the quantity and details of the goods under review can be entered in the columns marked " received " and added to the " balance in stock " column. Further, as and when goods are issued from stock, the storekeeper or his clerk signs the stores

Form No. 94.

LOCATION—	**STOCK RECORD CARD**					FILE UNDER—
USED FOR—	DESCRIPTION.					
	DATE					DIMENSIONS—
Average Weight	MIN.					
Per	MAX.					

PURCHASES.					ISSUED.			Balance in Stock.	ISSUED.			Balance in Stock.
Date.	Order No.	Price.	Quantity.		Date.	Order No.	Quantity or Weight.		Date.	Order No.	Quantity or Weight.	
			Ordered.	Received								

requisition and passes same on to the Cost Department. On receipt of this form a clerk in the Cost Department will deal with it in a similar manner, entering up the details under the heading " issues," and carrying down the stock balance. Concerning surplus goods returned to the stores from the works, the particulars obtained from the stores credit note are entered under " received " column, and the balance struck accordingly. Upon reviewing the whole procedure it will be observed that the Cost Department is in possession of sufficient information to enable them to see at a glance the stock or balance in hand of any particular materials in the stores, and furthermore, are consequently in a position to verify the " bin cards " as submitted from time to time by the storekeeper. In the case of " standard " stock materials becoming exhausted or reaching the minimum or re-order quantity, the storekeeper may notify the buyer by means of a " purchase requisition " that further supplies are needed. In this special instance the requisition form should firstly be sent to the cost office in order that the depleted or minimum stock under consideration may be verified, i.e. compared with the details on the stock record card kept by the Cost Department.

If found to be correct, the requisition number, date, etc., are noted in the purchase column on the stock record card, and the clerk initials the requisition and passes same on to the buyer for his attention. When differences arise, and this may often happen, between the stock record cards in the Cost Department and the bin cards, steps should be taken to locate the error before passing the requisition.

It is advised that the stores record clerk shall make periodical comparisons of the record of bin inspection with the stock record cards, and if any differences are shown the matter should be investigated before obtaining sanction from his superiors to make any adjustments. These adjustments are generally dealt with when balancing the stock control accounts, either monthly, quarterly, or at any specially agreed time in keeping with the general policy of the business.

When goods are manufactured in bulk according to a definite schedule, a list of all materials required for each batch of work may be prepared by the Planning Department or works chemist, etc., and in such cases the Stores, Cost, and the Production Departments concerned should be provided with copies to acquaint them of the various kinds of materials required, and the maximum quantities to be used in any specific job or order. The list of materials so used and generally referred to as a " bill of material " is a very useful document in any cost system. In such an instance the storekeeper is able to check all issues with the list, and the form should therefore be ruled so that a note of all particulars required may be recorded thereon. When bills of material are in use the rulings of the bin card may need to be slightly modified so as to include a column for " appropriations."

The stock records kept in the Cost Department may also require a little adjustment, and on page 333 an illustration is given of the ruling needed for that purpose.

When dealing with materials under this heading the stock record clerk will note from the Cost Department's copy of the bill of materials the goods, or materials, to be appropriated for definite production orders in a similar manner as described for the storekeeper. After a careful study of what has been said relative to purchasing, stores organization, and stores routine, it would be followed that complete supervision in routine and physical control has been accomplished simultaneously. The next step, therefore, is to show how the physical control is interlocked with financial control, and in such a manner that the existing routine may be operated to gain these objectives.

The necessity of proper financial control is of fundamental importance, since it is the determining factor in the accuracy of final records, both in the commercial and manufacturing accounts.

The grouping of materials under suitable headings considerably facilitates the financial control of stocks, and the following main classification is therefore advised—

(*a*) Control of standard raw materials (i.e. those which comprise the output of the works).

(*b*) Control of completely manufactured goods bought outside and resold in the same condition as purchased.

(*c*) Control of goods manufactured in the works which are ready for resale.

With regard to (*a*) and (*b*) the accounting transactions of these items in the commercial accounts are—

Dr. Purchases Account.
    Cr. Sundry Creditors.

In the cost accounts the control is effected as follows—

(*a*) *Dr.* Raw Materials Control Account.
    Cr. Purchases (Raw Materials).

(*b*) *Dr.* Factored Goods Control Account.
    Cr. Purchases (Factored Goods).

Form No. 95.

Location—

STOCK RECORD CARD

File Under—

Used for—

Description.

Date				
Min.				
Max.				

Dimensions—

Average Weight	
Per	

Purchased.					Issued.			Balance in Stock.	Appropriations.		
Date.	Order No.	Price.	Quantity.		Date.	Order No.	Quantity or Weight.		Order No.	Quantity	Balance Available.
			Ordered.	Received							

The total value of the stores requisitions, less the amount of stores credit notes, which represents the net value of raw materials issued from stores during a period is then journalized, from summaries prepared in the process of cost finding, as follows—

(*a*) *Dr.* Work in Progress Account.
Cr. Control Account (Raw Materials).

As and when components, or each batch of work, are completed and passed into the finished stores (*c*), the value of the work will be journalized as follows—

Dr. Finished Stock Control Account.
Cr. Work in Progress Account.

We now have the saleable product in the finished stores, and issues for dispatch to customers will be dealt with by journalizing the values represented by these stores requisitions as follows—

(*b*) and (*c*)—
Dr. Cost of Sales Account (or Trading Account).
(*b*) *Cr.* Factored Goods Control Account.
(*c*) *Cr.* Finished Stock Control Account.

The above Journal entries should be made at frequent periods, which may be weekly or monthly, according to the requirements of the business, and at the end of the accounting or financial period, the following adjustments are made—

Losses and wastage in stores as disclosed by the periodical inspection of stocks carried out by the storekeeper, which will be obtained from the " record of bin inspection," will be summarized, and a Journal entry prepared in the Cost Department, thus—

Dr. Stores Losses and Shrinkage Account.
Cr. Raw Materials Control Account.

It is sometimes the practice to debit any losses in the stores to the Work in Progress Account, and to close the account periodically by transferring from the Work in Progress Account (at the same time that completed work is transferred) to the Manufacturing or Trading Account in the financial books.

With some concerns it may be desirable to subdivide losses and shrinkages under all or some of the following headings—

1. Shrinkage.
2. Losses due to evaporation.

3. Breakages.
4. Loss in turnover (i.e. weighing, counting, etc.).
5. Faulty materials rejected by the works.
6. Obsolete stock, etc.

In conclusion, it will be seen that either of the above forms of stock record cards provide a perpetual inventory of all stores items, either in quantities or weights, and that the Stores Accounts (*a*), (*b*), and (*c*) provide a perpetual inventory in terms of money ; furthermore, the stores control accounts form the medium for reconciling the values of all purchases as shown in the financial accounts with the cost accounts.

It will now be perceived that full control over all material has been established, and its use to the various jobs, processes, or operations can be traced, thus completing the first step in founding the materials section of a costing system.

This method of stores control cannot be employed and maintained satisfactorily unless the administration of a works is properly developed. It certainly necessitates proper supervision, and some kind of planning throughout the course of production, and unless such conditions exist a different form of control should be adopted.

STORES—INSPECTION OF. (See Record of Bin Inspection, also Stores—Financial Control and Perpetual Inventories.)

STORES ISSUED BOOK. (See Stores Routine, also Stores Requisition.)

STORES LOSSES AND SHRINKAGE. The losses which arise within a stores may be divided into five groups—

1. Losses due to breakages.
2. Losses due to deterioration or evaporation.
3. Losses due to pilferage.
4. Losses due to the breaking up of bulk materials for issue in small lots.
5. Losses due to obsolescence.

It is sometimes the practice to include among the establishment expenses an arbitrary amount to cover all losses in the above directions, but unless some form of control or perpetual check is exercised by the management, any pilferage and carelessness in handling materials will not only continue throughout the year, but may increase to such an extent that considerable losses will be incurred.

Stores losses are of two kinds, namely, preventable and unavoidable, and both of these will occur in each of the groups 1, 2, 4, and 5 above; for instance, the losses or shrinkage caused by the breaking up of bulk materials for issue in small lots are unavoidable up to a certain point, but carelessness on the part of the stores assistants will often be the cause of excessive waste in this direction. Again, a certain amount of breakage cannot be avoided when handling certain kinds of materials, but carelessness will account for unnecessary wastage.

Pilferage, on the other hand, should be detected and the losses in this direction reduced to a minimum.

A form of bin inspection or perpetual check should be provided in order to obtain a record of all stores losses, and the method described under the heading of bin inspection will generally be found suitable for most stores.

The treatment of stores losses in the cost accounts will vary considerably in practice, as the method of recovering expenses in costs may determine the procedure. On the other hand, many concerns transfer the amount direct to Profit and Loss Account. When the expenses relating to the handling of materials are recovered in costs separately from the general shop expenses, the value of stores losses will be charged to that account; in other cases the amount may be included among the general factory expense rate. Any losses arising on factored goods or finished stocks, if stores are under control of Sales Department, should be charged to selling expenses. (See also COST CONTROL ACCOUNTS (MATERIALS SECTION).)

STORES ORGANIZATION AND LAYOUT. Storekeeping involves not only a very large number of transactions, but each of these transactions is in itself manifold, and although not all of them come under the heading of accounting, they are in entirety reflected in cost accounts. It is, therefore, quite evident that the organization of the Stores Department should be thoroughly efficient and well equipped. The purchase of materials will entail the provision of a suitable place for their storage. Sometimes in a small business very little heed is given to this important matter, and perhaps a disused shed or some corner of the works is all that is considered necessary, the turnover in stock being so small. A junior is placed in charge and it is considered unnecessary to employ a more responsible assistant, or to adopt a better system. This is not, however, the case in reasonably large businesses, where the stores may run into many thousands of pounds sterling per annum. Considering that each item of stock is represented by its equivalent amount of cash, the necessity for a properly constructed and organized stores is of paramount importance. Another important point not to be overlooked is the services of a thoroughly capable storekeeper. The operations of storekeeping begin with the receipt of goods or materials, and the status of the storekeeper may be likened to that of a cashier. He is responsible for the whole of the goods delivered to him, and this responsibility continues until he has issued them against authorized delivery notes or vouchers. It will be observed, therefore, that his duties will commence with a careful record of what he receives, and he must also be convinced that what he actually receives coincides in every detail with what he is supposed to receive. All goods should conform with orders. The storekeeper must necessarily be experienced and should have supreme control of his department. He should be held responsible for the whole of stock involved.

In the organization of a stores, provided it is to be efficient, due consideration must be given to the fact that all items of materials represent money, and that the records kept should "balance" in a similar manner to "cash." It should not, however, be assumed that by balancing stock means accounting in detail for the last pound of material in the stores ; this is sometimes impossible, for allowances of some kind may have to be provided for such contingencies as shrinkage, waste, deterioration of certain materials, etc.

The location and size of the stores will vary, according to requirements, being governed by the class of business carried on and the nature of materials concerned. The stores should be of a commodious structure, and large enough to meet all requirements. In the case of a new factory the position of the stores will present no difficulty. If, however, the position of the stores has to be considered in an existing building which will not lend itself to alteration, a compromise must usually be effected between the question of suitability and accessibility. The position of a stores in a small business will not need much consideration, as the receipt and issue of materials will be small in quantity and number. Such is not the case with a large factory, where materials running into many tons may have to be handled daily. The position must be carefully planned and considered in consultation with the Production and Receiving Departments. It is essential that every facility be provided for the handling of goods when received and placed into stock, also when issued from the stores to the various manufacturing departments. Heavy and bulky stock should be stored as near as possible to the manufacturing departments using such materials, so that when these goods are issued from the stores a minimum amount of labour, time, and handling is necessary.

Furthermore, another matter which must be taken into consideration, in deciding the position and layout of a stores, is the greatest distance any one of the manufacturing departments will be away from the stores. In order to eliminate the waste of time and labour in issuing materials to the various production departments in a large works, it is advisable to have separate or subsidiary stores located in convenient places within such production departments. If this practice is carried out the chief storekeeper will still receive all materials, as delivered, and issue to the branch stores only those particular goods that will be required in any production department to which the branch store is associated. For instance, in a tin canister manufacturing business, tin plates would be stocked in the Tin Plate Printing Department, cardboard for cardboard box-making would be stored in the Card Box Making Department, etc. The above portrays but one example concerning the difficulty of stores control. In some instances it may often be desirable that separate stores be provided for the different classes of materials to facilitate their storage and handling. In most engineering works brass and copper sheets, rods, screws, nuts and bolts, etc., are kept separate from iron and steel castings, and goods that are only partially complete are stored separately whilst they are waiting completion or assembly.

Such a stores may be known as a part finished stores, or component stores. Again, completely manufactured goods being ready for resale are also stored separately.

The storage of the different classes, or types, of materials is often conveniently done in the one store room, simply by dividing the stores into sections and placing such materials in their respective positions. This is usually found to be the most economical method with most of the medium-sized and smaller factories.

The general layout of the stores will be governed by the class and quantity of materials which it is intended to store. Small items, such as screws, nails, nuts and bolts, etc., should be provided with bins or shelves for their retention, and by judicious arrangement a great deal of materials of the smaller class can be stored in a relatively small space. Such items as iron, brass, and copper tubes or sheets will require upright partitions, in order that the various lengths may be kept separately and tidy according to diameter or size.

The method of storage in bins, etc., cannot be advantageously applied to all trades. Bulky materials will obviously require a totally different method. The class of materials used in a soap or chemical works would be so cumbersome and weighty that there is no better method than to stack them in a suitable shed. Tin plates, sheet lead, iron, etc., in large quantities are generally stored in a shed with a substantial concrete floor. It will be readily seen, therefore, that the general layout and construction of a stores in any class of business will be dependent upon and be determined by the nature of materials used. Further, materials affected by atmospheric conditions would require to be stored in a specially constructed and, perhaps, heated building.

When deciding upon the capacity of the stores and, in detail, of the bins, shelves, racks or other containers such as vats, barrels, tanks, etc., the normal maximum stocks must first be ascertained. The maximum stock is dependent upon the rate of use of the article, and also of the economical quantity to buy at one time. The rules to be observed in this calculation are simple. Firstly, the average rate of use must be considered, and secondly, how long it takes—taking the longest period, not the average—to obtain the economical quantity. The "minimum stock," or the quantity below which the stock should never be allowed to fall, is then represented by the quantity (plus a margin for safety) of the article which will meet the normal demands of the factory whilst the "re-order quantity" is being obtained. The "maximum stock" is taken at something above the totals of these two, but it may also be limited by financial consideration.

A stores should always be under the control of one person, who may be known as the storekeeper or stores superintendent. The responsibilities and duties of a storekeeper may be briefly summarized as follows—

1. To accept only materials or goods into his store when accompanied by a written record stating the quantity and description of the various items, also a note of the purpose for which they are required, and to sign for their receipt from the Receiving Department. (See form of Inwards Goods Note described on page 278.)
2. To keep all items of stock in their correct positions.
3. To keep the stores clean and tidy.

4. To prevent any unauthorized person from entering the stores.

5. To issue materials against a written authority only, which should be properly and correctly made out.

6. To check all requisitions he receives, which have been issued against a bill of material, production order or service order.

7. To check at frequent periods the quantity of goods contained in each bin, or rack, etc., with the quantity stated on the bin card.

8. To watch the stock levels and report—according to the recognized routine of replenishing stock—when the minimum is reached.

STORES RECEIVED BOOK. (See STORES ROUTINE, also GOODS RECEIVED—RECORD OF.)

STORES RECORD. (See STOCK RECORD CARD, also STORES CONTROL ACCOUNTS.)

STORES REQUISITION. A storekeeper should only issue materials against a written authority, and for this purpose there is usually provided a form known as a stores requisition.

A specimen stores requisition is given, from which it will be noted that a full description and quantity or weight of the materials, together with the order number for which they are required, are stated. On receipt of such a form by the storekeeper, he will proceed to hand out the materials and record the issue on his bin card, noting in the space provided the bin number from which the goods were issued.

The issue of all stores must be authorized, and a proper routine laid down whereby particulars of all transactions are recorded. In a well organized factory only certain individuals will be empowered to withdraw materials for use or dispatch, provided they formally authorize the storekeeper to make the necessary issue in accordance with the routine obtaining.

The persons or departments authorized to issue stores requisitions will vary with each concern, as the method of production control as well as the size of the factory will determine the best procedure to be followed in this direction. With the small works, for instance, the foremen of the departments may conveniently be allowed to requisition materials as required, but with large concerns the planning and progressing of work through the factory will entail that the withdrawals of material from stores be properly regulated and co-ordinated.

The illustration shown of the stores requisition conforms

Form No. 96.

STORES REQUISITION

P75984.

Order No. ....

Bill of Material No.............................. Date..

No. Off.	Weight.				Item No.	Description.	Filled from Bin No.	£	s.	d.
	Cwt.	Qr.	Lb.	Oz.						

Planning Department.	Stores Signature.	Stock Record.	Entered Cost Dept.

(*Form in Duplicate. Size 6″ by 4″*).

to the requirements of the larger concern where production control is exercised through a Planning Department, which issues all stores requisitions that have reference to materials required for all production orders.

When a " bill of material " is used the description of the materials required can be omitted from the requisition, as only the " item number " of the bill of material need be quoted.

The withdrawal of materials, etc., from stores for use on service orders may, however, be made by the foreman of the department, and for this purpose a different coloured form can be used with advantage.

All stores requisitions which have been presented to the storekeeper should be sent to the Cost Department at convenient periods throughout the day in order that the issues from stores can be recorded on the stock record cards.

The procedure of posting all issues on the stock record cards is greatly facilitated by the storekeeper inserting in the space provided on the stores requisition the bin number from which the goods were issued, as by this means the stock record clerk is able to refer at once to the identical card. Furthermore, the possibility of posting issues to the wrong card is almost eliminated.

STORES ROUTINE. The internal routine of a stores will chiefly consist of receiving and issuing of materials, as the bulk of the work performed by the storekeeper and his assistants will invariably be composed of such activities. The various other matters that should be dealt with, however, may sometimes be regarded as subsidiary to them, and consequently of lesser importance. A greater error of judgment cannot be made, as the responsibilities of a storekeeper are comparable with those of a cashier. He is responsible for the whole of the materials delivered to him and during the period they remain in his possession. If consideration is, therefore, given to the fact that all items of material represent money, the significance of his position should be quite apparent.

The problem of stores routine is simply one of " control and check," and should be applied on very much the same principle to that generally adopted for the Cashier's Department excepting, of course, that common sense must be allowed to decide the " limits " for balancing purposes. For instance, the receipts and payments of cash are expected to balance to the last penny, but in the case of materials this is obviously impossible for a variety of reasons, and a reasonable but safe margin should, therefore, be fixed.

Material control may be said to come under two categories, viz., the control of values as provided by the cost control accounts, and the control and check of quantities, as provided by the stock record cards, both being effected within the Cost Department. In order to obtain a clear conception of what this means, we will analyse the control of materials according to the various phases. Firstly, there is the purchase of materials, and next follows the receipt of the materials (see PURCHASING). From this point there will now be considered the phases of material control in so far as it affects the stores and the form of check exercised in the Cost Department. These may be detailed as follows—

Phase.		Routine Forms Effected.	
		In Stores.	In Cost Department.
1. Receipt and Inspection	Materials delivered to stores (with inwards goods note or other form of goods received record)	Inwards goods note	Inwards goods note
2. Stowing and Recording	Goods placed into their correct position in the stores and the item entered on the bin card and stock record card	Bin card	Stock record card
3. Issue and Recording	Goods issued to Production and Service Departments against stores requisition	Stores requisition, bin cards	Stores requisition and stock record card
4. Credit and Stowing	Return to stores of any surplus materials and issue of stores credit note in exchange	Stores credit note, bin card	Stores credit note and stock record card
5. Replacement of Depleted Stocks	Depleted stocks to be replaced by further quantity	Purchase requisition	Purchase requisition and stock record card
6. Checking	Contents of bins, etc., counted and checked and compared with record on bin cards and stock record cards	Record of bin inspection and bin cards	Record of bin inspection and stock record cards

From the above it will be observed that there are six main phases of material control within the stores with the corresponding check by the Cost Department, and each of these must be covered by any system. The actual details of the system must necessarily differ with the requirements of the factory, and the six phases in so far as they relate to the control exercised by the stores only are, therefore, further dealt with in conjunction with a system for the purpose of explaining the principles involved.

The method of check by the use of stock record cards in the Cost Department is explained under the headings of STORES—FINANCIAL CONTROL AND PERPETUAL INVENTORIES, also BIN INSPECTION.

Form No. 97.

BIN CARD

Bin No........................

Article...... .... Symbol No. ....

Max. Stock................ Min. Stock............... Drg. No.................

Date.	Reqn. No.	In.	Out.	Stock.	Date.	Reqn. No.	In.	Out.	Stock.

(*Size of Form, 8″ deep and 5″ wide.*)

1. **Receipt and Inspection.** Immediately goods are received into store from the receiving clerk or department the storekeeper places the goods into their correct position in the store. The necessary entry, or record, will now be made on a bin card, which should be provided with columns for recording brief particulars of all goods received and issued. The bin card may be ruled similar to the specimen given, above.

2. **Stowing and Recording.** A bin card, as illustrated, may be filed in drawers in order of material or bin number or hung up in a convenient place on the outside of the bin or rack, so that it is available for making entries as and when items are

placed into the bin, or taken out and issued to the factory for use on a production or service order. With most firms the various types or classes of materials are scheduled according to their process of manufacture, and given a reference number or symbol. This saves a great deal of time when preparing a list of materials required for the completion of an order, as only the reference number or symbol need be quoted. When such a method is in use, provision must be made for this reference to be stated on the bin card, and in the illustration referred to this is shown immediately below the bin number.

All bins, racks, shelves, etc., should be numbered consecutively in order to indicate to the storekeeper, or his assistants, their location. This number also serves to connect the bin card with the bin to which it belongs.

3. **Issue and Recording.** It is of the utmost importance that the purchase and delivery of goods to the factory be authorized, and a definite routine laid down which, whilst it places the receipt on record, also notifies the transactions to other departments, such as the cost office, production departments, etc. (See PURCHASING.) In a similar way the issue of stores must be authorized and a proper routine put into operation, whereby particulars of all transactions are recorded. In a properly organized factory only certain individuals should be authorized to withdraw materials for use or dispatch, provided that they formally authorize the storekeeper to make the necessary issue and comply with the general routine obtaining. In most cases this authority is given in the form of a stores requisition, and which may be ruled similar to the form shown on page 341.

On receipt of the stores requisition by the storekeeper, he will hand out the goods or materials required, and record the issue on the bin card, afterwards sending the stores requisition to the Cost Department.

Reference has already been made that branch stores may exist in some factories, and when certain kinds of materials are stored in bulk, such as tar, oils, waxes, etc., this issue will take a different form from that described above. In the case of tar this is usually pumped into large tanks when first delivered, and the quantity to be used for, say, distillation will always be regulated according to some standard formula. A stores requisition may not be used, as the exact quantity required for the process may be drawn from the tank or vat, and the amount used entered on the particular bin card, or other more convenient form of record.

4. **Credit and Stowing.** Materials issued to the works for manufacture will often consist of items that cannot be conveniently measured into the exact quantity that will be required for the particular operation, process, or batch. For instance, tungsten wire, used in the making of electric lamps, is supplied wound on reels, and owing to its brittle nature must be used with a minimum amount of handling in order to avoid excessive waste, and again enamelled copper wires used for armature winding must also be handled carefully for similar reasons. Under these circumstances it may be the custom to issue to the workers the whole reel of wire, the balance remaining on the completion of any job being returned to the storekeeper, who will then weigh it and issue a stores credit note for the quantity returned.

A similar procedure to that described above will be found necessary in many cases, especially when rod or bar metal is issued, and only a small piece required. It is understood, however, that circumstances will alter cases because it may sometimes be found possible to cut off, or weigh, the exact amount required. In the case of returns to the store of surplus materials, some kind of a form must be provided. This form should be on similar lines to that of the stores requisition, but printed in red, and headed " stores credit note " or " surplus materials returned to stores." When surplus materials are returned to the store, the storekeeper must check the quantity or weight, and place it in its proper bin or rack, recording on the bin card the quantity and the serial number of the credit note or " materials returned to stores note." This credit note is then passed into the Cost Department where the necessary records are made. It is essential that particular attention be given to the procedure of surplus materials returned to the store, for they are dealt with quite differently to materials returned from the production shops as faulty, defective, or as unsuitable for manufacture. Regarding rejected materials, spare parts, etc., a rejection note will be made out according to routine in the works, the reason for such rejection being stated thereon. These rejected materials will be received into the store in the usual way, but they will not be stowed away with other materials, or entered on the bin card, but placed in a special position to await disposal at the instruction of the buyer.

5. **Replacement of Depleted Stocks.** By following the above methods it will be seen that the storekeeper has a complete written record of all items in his store, together with a

note of all issues to the various manufacturing and service departments. All these records show on the bin cards and by extending into the appropriate column the balance of each item remaining in stock after an issue has taken place, the storekeeper is able to observe when the balance in hand is about to reach the " minimum," and take such steps as may be necessary to replenish his stores. In most works the procedure in regard to general stores items is for the storekeeper to notify the buyer that certain goods have reached the " minimum," and this may be done by making out a purchase requisition as illustrated and described on page 268.

6. Checking. Periodical checking of stocks is of utmost importance, and one of the chief duties of the storekeeper is to frequently check the contents of his store in comparison with the records as shown on his bin cards. A very convenient and satisfactory method is for the storekeeper to check a fixed number of items each day, so that at least once in, say, three months a physical check of all items in stock has been carried out.

It is unwise to rely upon the annual stocktaking at the end of a year's trading, for during such a long period it is possible that errors and discrepancies of large dimensions may have been made, and these are not easily rectified at so late a date. The importance of more frequent checkings will, therefore, be thoroughly appreciated. The storekeeper should be provided with suitable means for recording the results of his daily count, and this may conveniently take the form of the record of bin inspection as described on page 21.

It will be noted that such a form serves two purposes: firstly, it provides a log of all bins, racks, shelves, etc., in numerical sequence ; and secondly, has suitable columns for recording particulars in regard to each bin as it is checked. Further, a third purpose may be gained, and that is, the storekeeper will be able to tell in which items of stock error most frequently occurs. The cause can then be investigated and suitable action taken to obviate such errors. The record of bin inspection is passed to the Cost Department, where it is compared with the stock records kept in that office.

Accurate storekeeping is of fundamental importance, and true stocks can only be maintained by sound organization, rigid supervision, and frequent checking.

The actual method or system as affecting material control will differ with each factory, but the preceding remarks should be sufficient to indicate the main phases of this work in the stores proper. The form of check exercised by the Cost Department is explained under the heading of STORES—FINANCIAL CONTROL AND PERPETUAL INVENTORIES.

STORES TRANSFER NOTE. In order to eliminate the waste of time and labour in issuing materials to the various producing departments in very large works, it may be advisable to have separate or subsidiary stores located in convenient places within such departments. When this practice is followed, the chief storekeeper receives all materials as delivered, and then issues to the respective branch stores only those goods that will be required in the particular production departments.

The transfer of material from the main stores to a branch store should be properly authorized, and for this purpose a stores transfer note is used. A specimen form is given which is ruled very similar to the stores requisition, but to differentiate it may either be printed in red or upon a coloured paper. A stores transfer note is issued in duplicate and dealt with by the issuing stores in the same manner as an ordinary stores requisition. The receiving stores, however, will enter the item on their bin card as a receipt and then pass the form on to the Cost Department, who will enter it on the stock record cards as a credit to the main stores and a debit to the branch stores.

When a system of stores or material control accounts is in use, the value of the stores transfer notes will be summarized at the end of each month or other period, and the main stores credited with the total value of materials transferred and the various branch or sub-stores accounts debited.

STOWING AND RECORDING. A name applied to the work which is performed by the storekeeper when receiving goods into his stock, and consists of placing the goods into their correct position in the stores and entering the item from his copy of the goods received record on to the bin card. This phase of a storekeeper's duties immediately follows that of receipt and inspection and precedes that of issuing and recording. (See also STORES ROUTINE.)

STRAIGHT PIECE WORK. (See PIECE WORK—METHOD OF REMUNERATING LABOUR.)

SUNDRY MATERIALS. (See EXPENSE MATERIALS, also MATERIALS—CLASSIFICATION OF.)

TAYLOR DIFFERENTIAL PIECE RATE. METHOD OF REMUNERATING LABOUR. Under this method the day wage is not guaranteed. There are two piece rates, the lower

Form No. 98.

STORES TRANSFER NOTE

No............*T1*...........

From MAIN STORES to.......................................Stores. Date...

No. Off.	Weight.				Description.	Filled from Bin. No.	Price.		
	Cwt.	Qr.	Lb.	Oz.			£	s.	d.

When transfer of material is complete, this form is to be immediately sent to Cost Department.

Issuing Storekeeper's Signature.	Receiving Storekeeper's Signature.	Placed in Bin No.	Posted to Stock Cards by

of which is in operation up to a standard of performance of 100 per cent, up to which point the operator receives approximately 83 per cent of the daily wage rate, or up to 99 per cent production he cannot make the equivalent of his daily rate. The moment, however, he touches 100 per cent output not only does he receive an immediate increment which brings his pay to the equivalent of time and a quarter, but also he is paid at the higher piece rate. The effect of this is to penalize the inefficient worker. To give a large immediate increment on attaining 100 per cent efficiency, and also the higher piece rate offers a very strong incentive to the operator who can make himself efficient.

Its effect on cost per piece produced is very marked on account of the great reduction of indirect expense (oncost) per unit of product.

Doctor Taylor was the first to ignore all records of past experience which concerned either rates of production or the length of time an operation should take. He based his standard times upon accurately made time studies, and as an extra aid to the workman prepared standard instructions showing how the work should be carried out to attain the times set.

It is essential for the success of this method that there should be approved time study practice by qualified observers —detailed instructions to the operators and real co-operation between the Time Study or Rate Setting Department and the workers.

It is interesting to note that Taylor was also the first to make use of a scientific system of paying labour, although Halsey presented the first incentive plan.

TELEGRAMS. (See TELEPHONE CHARGES.)

TELEPHONE CHARGES. The rent of telephones and cost of all calls form part of establishment expenses. The rent of telephones can be easily allocated direct to the respective departments. The cost of calls in the case of small firms is usually apportioned arbitrarily according to past experience, but with large concerns who have a private switchboard, the operator will record all outgoing calls, and in such case the expense in this direction can be allocated direct to the respective departments.

When a concern takes advantage of the facility to transmit telegrams over the telephone, the Telephone Account will contain charges for telegrams, and the item will be apportioned or charged direct in a similar manner as above.

With companies that have installed a private system of internal telephones a standing or service order will be used for ascertaining the cost of maintenance and upkeep, etc., and the total of this account apportioned as above. In some instances, however, the standing order will be subdivided or coded so that the cost of maintenance, etc., is ascertained separately for each department.

TERMINAL COSTING. This is a term that is sometimes used when referring to the method of cost finding employed to ascertain the cost of carrying out a contract, such as the erection of buildings, bridges, or irrigation schemes, etc. This method of costing, however, is similar to the job costing system, and all the various items are charged to a specific order, but in this instance the order will cover the erection of buildings, etc., and not the manufacture of one or a quantity of articles.

In order to explain the detailed working of terminal costing, a brief description of builders' costing is given. (See also Cost Finding, Methods of.)

In the building industry, a cost ledger is used to a much greater extent than with other industries, and a general outline of the procedure usually followed in connection therewith, and with the acceptance and execution of contracts, etc., will be useful.

When a contract is agreed, no record should be made in the books of account. The contractee (i.e. the party for whom the work is undertaken) must not be treated as a debtor until work on his account has actually been carried out.

Extras are an important item, and the foreman supervising the contract should issue a separate variation order for each extra agreed upon.

Special clauses included in a contract will also need particular attention, as "Liquidated damages" paid under a "Penalty clause" will, of course, reduce the profit. Alternatively, there may be terms that afford an opportunity to swell the profit by the winning of a bonus granted for completion within an allotted period. On the other hand, provision may be made that the final payment shall only become due on a date following completion of the contract, and in such cases it is then the practice either to close the account by crediting same and debiting a "Retention Money on Contracts Account," or crediting the Contract Account and debiting the Personal Account of the contractee, thus

Form. No. 99.

Dr.

COST LEDGER

Cr.

JOB NO. ....

LOCATION..

Date.	Particulars of Debit.	Ref.	Direct Hours.	ANALYSIS.									TOTALS.			Date.	Particulars of Credit.	Cash Book Reference.	Amount.
				Excavating.	Concreting.	Draining.	Bricklaying.	Tiling.	Carpentry.	Plastering.	Plumbing.	Sundries.	Labour.	Materials.	Direct Charges.				

NOTE—In posting to the cost ledger, the wages of mechanics and labourers, materials, and sundry expenses will appear in two columns on the debit side, viz., firstly, the items will be shown in the trade columns to which they relate, and the total of each element of cost will also be extended to one of the three total columns that conclude the debit side.

leaving the items to be shown in the balance sheet as included in " Sundry Debtors " as an asset.

When balancing the financial books, it is not wise to take credit for a gross profit on a contract equivalent to the entire value of the work done to date. In order to provide against contingencies, it is advisable to take credit for, say, two-thirds of the profit, based on the proportion of work completed to date.

Minor jobbing work, such as the repairing of roofs and windows, the unstopping of drains, and cartage, etc., can be posted to a general " Jobbing Account " in the costing ledger. Detailed particulars of the invoice will be recorded in a " Jobbing Day Book," to which reference should be given in the column provided in the ledger.

Labour. The time sheet may be daily or weekly. For small jobbing work, where a record of all work done is required, the daily time sheet may be preferable. Where, on the other hand, the workman need only quote on his sheet the job number against the time spent, the weekly time sheet has the advantage of recording time spent on the several jobs, and also may be so ruled as to serve as an analysis and summary of the wages paid to each man.

The total wages thus analysed on each sheet should be entered at the end of each week on to the pay roll or wages abstract, which in the building trades is generally ruled as shown on page 354.

The total amount of wages for the week will be posted to the credit side of the cash book, and the total of the weekly summary in the pay roll or wages abstract should agree with the cash book entry. The amount dissected should be the gross figure, i.e. including the employer's contribution to the National Insurances, together with any bonuses that may have been earned by the workmen. The analysis and summary in the wages abstract may cover not only current contracts and jobs, but also job numbers for other wages expenditure, such as repairs and renewals to plant.

Materials. The first stage in the analysis of expenditure on materials for the various jobs in hand should be effected by means of an analysed form of purchase day book, as by this means all purchases can be analysed into, say, four sections, i.e. (1) purchases direct to jobs ; (2) purchases for general stores ; (3) plant and tools (capital) ; (4) plant and tools (repairs and renewals).

Sections 1, 3, and 4 are self-explanatory, but in regard to

Form No. 100.

WAGES ABSTRACT

*Week ending*______________________192_____

Job No.__________				Job No.__________				Job No.__________				Job No.__________				SUMMARY.				
Trade.	Workman's No.	Hrs.	Amount.	Trade.	Workman's No.	Hrs.	Amount.	Trade	Workman's No.	Hrs.	Amount.	Trade.	Workman's No.	Hrs.	Amount.	Job No.	Trade.	Hrs.	Amount.	Cost Ledger Ref.

(2) purchases for stores, these items will need to be further analysed, in order to ascertain the value consumed on each contract. This will be effected by using a system of stores requisitions in a similar manner to that described under the headings " Stores Requisitions," " Stores—Financial Control and Perpetual Inventories," etc.

Direct Charges. Such items as travelling expenses, accommodation, and similar allowances for men away on jobs, as also the carriage on plant, etc., will be collected periodically from the financial and cost books, and charged to the respective contracts in just the same way as direct charges are dealt with in job costing.

Establishment Expenses. In the case of an ordinary building contract, such indirect expenses as rent of any land or buildings occupied for the purposes connected with the execution of a specific job, clerks and timekeepers employed at the works, depreciation of plant and machinery, and the provision of such general essential services as power, lighting, heating, etc., which are incurred on the job, present little difficulty, for expenditure of this character is clearly identified with the contract, and will, therefore, be charged to the cost account similarly to the ordinary items of direct charges, excepting that these amounts should be kept quite distinct from the more " direct " expenses.

The building contractor, however, may have a central " works," with stores and all other necessary materials relating to such works. There may also be technical men passing from one contract to another, and the establishment expenses will thus have to be apportioned to the various jobs. This may be effected by using either the direct labour or direct labour hour basis ; the latter generally gives the better results. However, for a detailed consideration of this particular subject, see COMPUTATION AND RECOVERY OF EXPENSES.

TERMINOLOGY. (See COST.)

TIME BOOK. Many years ago it was sometimes the practice to record the arrival and departure of workers by entering their names in a Time Book. The actual method of writing up this record varied in almost every case. With the very small concerns the Time Book would be placed in some convenient position at the entrance to the factory, so that each worker could sign his name therein when entering and leaving every morning and midday, etc., but with the larger firms it was found necessary slightly to modify the method on account of the considerable delays caused by the time taken when signing the book.

The time clerk or gatekeeper would, therefore, stand at the entrance to the factory and note the names and time of each worker when entering the premises at mornings and midday, etc. In some instances it was the practice for the time clerk to go round each department during the mornings and afternoons and enter the names of each worker, and so compile the register of attendance in this manner. It will readily be seen that any of the above methods are most unsatisfactory, as disputes in regard to errors of booking time can never be settled to the satisfaction of employer or employee.

The Time Book method is now only used in exceptional cases, such as an " owner-manager " business and where a few men are employed.

TIME CARD. (See CLOCK CARDS.)

TIME DOCKET. A term that is sometimes used and may refer to a " time sheet " or " clock card," which see.

TIME RATE METHOD OF REMUNERATING LABOUR (also known as **Day Work, Day Wage, Time Work, Day Rate**). This method of remuneration resolves itself into a bargain between the employer and the worker, that in exchange for a stated sum of money paid by the former, the latter will attend the employer's works for a fixed number of hours per day or week, and be amenable to such rules and regulations as the employer may enact. There is no bargain that the worker shall do any specified quantity of work in return for such payment, in fact he may frequently not be working at all ; in practice this actually does occur, yet on the official pay day he is entitled to receive the amount of money bargained for, subject to deductions for being late or absent.

There are innumerable objections to this method. As men varying in ability are given an equal wage, its principle is both unsound and unfair. The highly skilled worker, capable of producing work which in quantity and quality is far above the average, receives no higher pay than he who is slipshod in his methods and an ignoramus at his work. It is a characteristic of time work that output relatively is small, and this leads directly to excessive labour cost and, where expense is calculated as a percentage on labour cost, to an excessive overall cost.

It is also very costly, because under it workers are afraid to establish fast times, being apprehensive that the quickest recorded time might conceivably be used at some future date to establish a low piece rate should a change in the method of payment be decided upon. It is also considered that an excessive amount of supervision and " driving " is required in order to obtain any approach to what is considered a reasonable amount of work. Inasmuch as the payment is for an indefinite amount of work, it is consequently almost impossible for an employer to arrive at a figure which will enable him intelligently to tender for contracts.

This method is of almost universal application and (except for indirect workers whose work is of such a nature that it is difficult—though not always impossible—to pay them by any other method) the only excuses for its continuance are custom and its ease of computation. The variants of the time rate, involving payments of premiums or bonuses, will be found described under their various titles. (See also REMUNERATION OF LABOUR—METHODS OF.)

TIME RECORDERS. The method of checking men in and out of the factory by the use of metal checks has been almost superseded by the more reliable method of automatic time recorders. The chief advantages derived by the use of time recorders may be summarized as follows—

1. They prevent disputes in regard to time as a worker can see for himself the time that he has registered.

2. They enable a correct allocation of the times spent on various jobs or processes to be obtained.

3. They allow the system of time booking to be easily modified or amplified to meet changing conditions, as they can be readily installed in any part of the factory.

It is essential that all time recorders register the correct local times, and many firms who use a number of clocks find it an advantage to have them synchronized so as to keep identical time.

The actual position in which the time recorders will be placed in any factory will vary to a considerable extent, but when separate recorders are used for the purpose of booking the attendance of workers at the factory and for booking time to jobs, etc., it is preferable that the one set of clocks be located at the entrance and the others placed in a convenient position inside the factory.

When the same clocks are used for both purposes, they may be installed in the various departments, and in such cases a few minutes should be allowed the workers in passing from the gate to the clocks for registering, but if separate clocks are placed at the gates it is usual that a method of supervising the men during the process of clocking " in " and " out " be instituted. There are two general methods of doing this. The first is to have locks affixed to each clock and the gatekeeper to open the recorders for use at stated times, and then to lock them up a few minutes after starting times ; alternatively, locks are fitted to the card racks, which are locked between starting and finishing times to prevent their unauthorized use. In both cases, however, the gatekeeper or other official should be present whilst the clocks are being used.

The cards used by the men at the gates are essentially the record of attendance, from which all time wages are calculated. Many terms are used when referring to these cards, such as clock card, time card, time ticket, etc., but it is considered that the term " gate card " is the more correct.

There are a number of time recorders available, such as the Gledhill-Brook, Dey, Bundy, Blick, International, National, etc., and a description of each will be found under its respective heading.

For a description of the routine in connection with the recording of time on " gate cards," see under that heading. (See also TIME RECORDING.)

TIME RECORDING. Labour is a fundamental element of cost, and its treatment both in regard to the remuneration of workers and the allocation of labour costs to jobs and processes, etc., will require careful consideration.

The recording of a worker's time will generally fall under two headings—

1. Record of attendance at the factory.
2. Record of the time spent by workers upon each task or factory order.

The record of time spent in the factory, which forms the primary basis of calculating the worker's pay each week, must be made quite separately from that of the time spent on each task or order, as in practically all industries it is a trade union rule that each worker shall be guaranteed a minimum rate of pay per hour or per week, irrespective of the quantity of work done.

This distinction between the time records is also necessary when a bonus or reward is paid as an inducement for increased effort, and also for the purpose of analysing time to individual jobs or processes.

Male and female labour will usually require different treatment in the costing and pay roll records, as different rates of pay operate according to age, degree of skill attained, and the nature of the work performed.

The actual method that will be used for recording time will depend upon the number of workers employed, the nature of the work performed, and the method by which they are rewarded for extra production.

1. **Recording Attendance at the Factory.** There are a number of ways of recording the time a worker enters and leaves the factory, but all of them may be classified into three groups—

(*a*) Written records.
(*b*) Metal checks.
(*c*) Mechanically printed records.

(*a*) A written record of the arrival and departure of workers—a legacy of the antiquated methods of factory management of years ago—was perhaps the first method used and, owing to the many disputes that invariably arose through inaccuracies and differences, etc., the method has been modified and amplified in several ways. The methods now used may be classified under the following headings, and a full description of each will be found under the respective titles.

Time Book, which is used in three ways—

(1) The book is signed by each worker when entering and leaving the factory premises.

(2) The times of each worker are entered by the time clerk or gatekeeper who stands at the entrance of the factory.

(3) The time clerk goes around the works at a fixed time each morning and afternoon and notes the names of each worker.

With the very small factory any of the above methods may be used, but in cases where a dozen or more workers are employed, they will be found most unsatisfactory and unreliable, as a considerable amount of friction and arguments are caused when times are disputed. (See also TIME BOOK.)

(*b*) METAL CHECKS. In order to overcome some of the weakness attached to the use of time books, there has been introduced a system whereby each worker is provided with a brass check on which is stamped his " check " number. The checks are hung on boards in numerical sequence and placed at the entrance to the factory. As each worker enters, he lifts his check from the board and drops it into a box and proceeds to his work. After all employees have passed into the works, the box containing the checks is removed by the gatekeeper and the numbers on each check entered in the Time Book. The checks remaining on the board are also listed, and the list, together with the Time Book, sent to the Wages Department as notification of absentees.

This method is just as unreliable as time books. Disputes will arise in many instances, which can rarely be settled to the workmen's satisfaction, owing to the absence of a reliable written record. It is not uncommon also for a workman to " lift " his absent friend's check from the board and drop it into the box with his own, thus registering the attendance of absentees. (See also METAL CHECKS.)

(*c*) MECHANICALLY PRINTED RECORDS. A mechanically printed record is necessary if absolute accuracy is desired. A mechanical time recorder will prevent disputes and establish confidence as an employee can see each registration when made.

With these methods the times are registered either upon cards, a separate card being provided each worker, or on sheets containing spaces for a number of workers. Automatic time recorders are, therefore, classified into two groups—

(1) Card time recorders.
(2) Miscellaneous time recorders.

(1) *Card Time Recorders.* These machines give a weekly tabulated card record of every employee, printing the day, hour, and minute. A time recorder is placed at the entrance to the factory, and on either side are fixed two card racks for holding the cards in numerical order. On entering the employee takes his card from the " out " rack, places it in the clock, registers his time, and then puts it in the " in " rack. When leaving the above process is repeated.

The cards used by the men at the gates, and known as " gate cards," are essentially the record of attendance, and from which all time wages are calculated. Many other terms may be used when referring to this card, such as clock card, time card, time ticket, wages card, etc., but none of these correctly describe the particular form. (See also TIME RECORDERS, GATE CARDS, and BOOKING TIME TO JOBS—METHODS OF.)

(2) *Miscellaneous Time Recorders.* With miscellaneous recorders the registration of the time is made on a sheet or tape and the various kinds of recorders available chiefly differ in the mode of registering. The key time recorders, for example, make use of numbered keys, which are hung on

boards similar to the metal check method, one board being for " in " and the other for " out." To register, each employee takes his numbered key and inserts it in a keyhole in the recorder. A printed impression is thus made on a paper tape inside the recorder of the hour, minute, and the distinctive number of each employee. The records thus appear in chronological order, so that the records of late arrivals are automatically grouped together.

In the case of the " Dey " time recorder, the time is recorded upon sheets which are ruled to accommodate employees in groups of 50, 100, or 150. With this type of recorder, the registration is made by means of a pointer-arm, which is swung round until it is over a hole in line with the worker's " clock " number, and pressing the pointer into the hole.

Recorders of the autograph type are sometimes used, but their employment is more suitable for recording the times of the works and office staff, etc. (See also TIME RECORDERS.)

A description of the various types and makes of automatic time recorders will be found under the following headings—

Bundy key time recorder.
Blick time recorder.
Dey time recorder.
Gledhill-Brook time recorder.
International time recorder.
National time recorder.

2. Recording Time Spent by Workers upon Each Task or Factory Order. The actual method of recording the time each worker spends on individual orders or operations, etc., will depend upon the system of wage payment in use and the nature of the work performed. The records in this direction may be classified into two groups—

(1) Recording time spent on production orders.
(2) Recording time spent on service orders.

In these instances, where the same method can be adopted for (1) and (2) above, it is desirable that different coloured forms be used to differentiate between the two classes of work, but when this is not possible two or more methods may be necessary.

The variety of methods that are available for either group may for the purpose of consideration be classified into—

(*a*) Written records.
(*b*) Printed records.

Recording Time Spent on Production Orders. (*a*) Written Records. When a worker's time is allocated by means of written records, there will generally be used a time sheet on which is inserted the commencing and finishing times for each task, and the use of such a method is only desirable when it is found to be impracticable for direct workers to record their time by means of automatic time recorders. In many instances this is the only method that can be used with advantage, owing to the special nature of the work. In a certain chemical mixing process, for instance, a direct worker will be in charge of several mixers and his time cannot, therefore, be definitely allocated from hour to hour to each mixer, but only apportioned at the end of each day. The use of a time sheet in such a case is the only satisfactory means available. (See also Time Sheet.)

(*b*) Printed Records. Automatic time recorders enable a worker's time to be definitely allocated to each task with a greater degree of accuracy than is the case with written records if the system is connected or " tied in " with a method of inspection and viewing. There can be no standard system of booking time to jobs by means of time recorders, as the special conditions of each factory will necessitate a routine being devised accordingly, but whatever method is adopted there will be used a clock card, known as a job card, on which the times will be printed. (See also Booking Time to Jobs.)

Recording Time on Service Orders. In practically all industries there are varying kinds of service which have to be rendered the producing departments, such as attending to simple breakdowns of machine tools and plant, replacing broken belts, repairing of leaks in water pipes, or making small alterations to the lighting system, etc., and in cases where there may be only one or perhaps a few men engaged upon this class of work, it is not practicable for them to book their time by means of automatic time recorders, owing to the short periods they are engaged upon each of these sundry jobs ; for instance, the sundry jobs performed by millwrights will not only vary from, say, a quarter of an hour to one hour each, but the work may be done in several departments, and as the workmen may not be continuously engaged on such work, the allocation of their time is more conveniently effected by the use of time sheets in preference to clock cards. With large factories, however, it is often possible definitely to allocate each worker to a specific job owing to the large number of men employed on this class of work, and in such cases their time could then be analysed by using clock cards.

TIME SHEET. A form used by employees to record thereon the amount of time which they have spent upon individual jobs or services during the day, week, or other period.

Time sheets are only used in those cases where it is found to be inexpedient or impracticable for the workers to allocate their time by means of automatic time recorders.

The utility of such a form may be considered under the following headings—

1. **Indirect Labour.** The considerations referred to on the previous page, under the head of RECORDING TIME ON SERVICE ORDERS, will here apply.

2. **Direct Labour.** In some industries the nature of the work to be performed is such that time sheets are used by the direct workers when it is not possible to allocate their time by means of mechanical time recorders. In the manufacture of paint, for instance, a direct worker may be engaged in the Milling and Grinding Department, and as he will usually be in charge of several mills, his time cannot be definitely allocated from hour to hour to each mill, but only apportioned at the end of each day. A time sheet in such a case is the only satisfactory means available.

A specimen time sheet is given on page 364. It will be noted that there is entered in the columns provided the order number and particulars of the work performed or service rendered, also the time of commencing and finishing each day. At the end of each day or week the time sheets are passed on to the wages section of the Cost Department, and the total time shown thereon compared with the times stated upon the gate card, and any differences investigated.

When time sheets are used to any great extent, it is often very difficult to ensure that all workers enter up their time each day, the tendency being for the sheets to be written up on the last day of the week. In order to avoid this difficulty, time sheets which are ruled to accommodate the times for one day only should be used so that the workers can hand them in to the time office on leaving the premises at night, new time sheets being handed out to the men the next morning upon entering the factory.

TIME SLIP. (See TIME SHEET.)

TIME TICKET. (See CLOCK CARD and TIME SHEET.)

Form No. 101.

TIME SHEET

NAME...TRADE........................RATE........CLOCK NO.........WEEK ENDING..................................

Order No.	Description of Work.	DAYS.																TOTAL.	
		Thu. p.m.		Fri.		Sat.		Sun.		Mon.		Tues.		Wed.		Thurs.			
		From	To	From	To	From	To	From	To	From	To	From	To	From	To	From	To	Ord. Time.	Over-time.
	Total Hours per Day																		
																	TOTAL HOURS		

NOTE.—It is Particularly Desired that this Sheet be Compiled at the End of Every Day.

Foreman's Signature..

Size of Form 10″ by 8″.

TIME WORK. (See TIME RATE—METHOD OF REMUNERATING LABOUR.)

TOOLS—DEPRECIATION OF. The amount of depreciation of small tools, both perishable and permanent, is a charge to factory expenses.

With small perishable tools, such as hammers, files, screwdrivers, drills, etc., the amount of depreciation may be ascertained in several ways ; for instance, the total purchases made may be charged to an account, and at the end of the period the stocks remaining are valued and the difference " written off " as depreciation. With this method the small tools issued to the producing departments, and still in use at the time of stocktaking, are valued and included in the total. Another method is to regard all issues from the tool stores as replacements of the original equipment, and to charge the amount to revenue as depreciation.

With such a method it is necessary that an inventory be made at the end of a financial period of all tools in use, which are priced at, say, two-thirds their value. The total of this inventory represents the capital value of the asset, and future issues of tools are charged out as stated above.

When the amount of depreciation has to be allocated to the various producing departments, this is usually effected by means of a system of service orders.

TOTAL COST. Sum of all items of expenditure *incurred* to produce, manufacture and market any commodity, or to render a service, i.e. the total of factory cost, plus selling, and distribution, also administrative expenses.

TRANSFER NOTE. (See WORKER'S TRANSFER NOTE, or STORES TRANSFER NOTE.)

UNABSORBED EXPENSES. (See COST CONTROL ACCOUNTS, also ESTABLISHMENT EXPENSES.)

UNABSORBED FACTORY EXPENSE ACCOUNT. (See COST CONTROL ACCOUNTS.)

UNALLOCATED TIME. A term used when referring to the " idle time " or time lost by direct workers in changing over from one job to another or for various other reasons.

In all manufacturing concerns there will always be stoppages and delays due to many causes, some of which are unavoidable ; for instance, time may be lost in reporting to the foreman between jobs, in waiting for a fresh order to be issued, waiting for materials, in " washing up," or any other cause which will keep the workers away from their " productive " work. In those industries where the time lost is due to many reasons, a series of service or standing works orders is generally brought into use, so that all unallocated time can be collected and analysed and the cause shown.

The total amount of unallocated time is generally charged to the department's Expense Account. (See SERVICE ORDERS, also BOOKING TIME TO JOBS—METHODS OF (NO. 7).)

UNEMPLOYMENT INSURANCE. The employers' contributions form part of the establishment expenses of a business, and the amount is allocated direct to the Factory Departments. The actual amount for each department is obtained from the pay roll.

When the factory expenses are analysed by departments, the pay roll should be drawn up accordingly wherever possible, so that the amount of the employer's contribution per department can easily be ascertained.

When a departmental analysis of the pay roll is not possible, the amount is sometimes apportioned arbitrarily, but in large concerns the actual analysis must be made of this expense item.

UNIFORM METHODS OF COSTING. An appreciation of the benefits which accrue to the individual industrial concern leads directors to the idea that, if all the other concerns in their own particular branch of industry could be persuaded to adopt the same system of cost accounting, it would create a situation which would be full of advantages. Indeed, there are those who go farther, and who envisage the adoption of standardized systems for all industries just in the same way that an orthodox form has been agreed upon for the presentation of financial accounts.

The subject of standardization in cost accountancy formed the basis of a discussion held under the auspices of the Institute of Cost and Works Accountants in 1923, and a brief survey of the possibility of standardization in cost accountancy, its advantages and its difficulties as placed before that meeting is as follows—

One of the principal advantages of an effective costing system lies in the provision of a means of measurement of actual performance against agreed standards ; thus the manufacturer is able to compare the cost of one batch of products, against his estimate, or against another batch produced later, and under different conditions, or is enabled to compare the cost of one process against the cost of another one, involving perhaps greater capital outlay for the production of the same article ; he is enabled to set a measure of profit to be earned by each section of his factory, and to compare the actual results with the standard which he has laid down.

It is this function of cost accountancy which possibly makes the idea of standardized systems for one branch of industry so attractive. It would be extremely helpful for manufacturers at the conferences of their trade associations to be able to think and speak in exactly the same terms when dealing with the cost of production ; a standard could be set up for the industry, and the factory manager who is unable to achieve such standard of performance could be shown exactly in what direction economies could be effected. It would be of very great value indeed in times of trade depression to make use of cost figures for the purpose of agreeing upon price reductions without resorting to cut-throat policies. Price reductions based upon accurate costs would naturally show each manufacturer exactly what problems he had to face, and to what extent it would be necessary for him to finance his business.

Appreciating then these obvious advantages which the standardization of cost accountancy by industries would appear to offer, the difficulties only become apparent when attempt naturally follows to put them into practice. Let it be stated at the outset that the standardization of cost accounts, and of their form for all industries is not practicable, if for no other reason than the divergence of the nature of the products of industry. Thus, we may distinguish between industries which produce in bulk, industries which produce in detail, and industries the measure of whose output is the service rendered. Obviously, the basis of the cost accounts for these three types of industry is so divergent, and requires such different treatment for the examination of results, that uniformity becomes a matter of supreme difficulty.

Dealing then with the minor groups of industry, we again encounter technical difficulties in the presentation of uniform accounts, and possibly the principal cause for this lies in the differing natures of the raw materials of each firm's saleable products. Possibly one of the best examples which may be cited is that of the copper industry. In this industry there are factories whose raw material is the ore, in others the ingot, in others again the first rolling from the ingot, while another group will use large diameter rod, or heavy sheet, working this up into their saleable products. Others, again, such as electric cable makers, carry out a number of the processes of copper wire drawing, and apply to them other raw material such as bitumen, india-rubber, cotton, paper and the like, producing a finished article in which are combined not only the processes inherent to the copper trade itself, but others which are allied to the processes employed in totally different industries. Again, in the waterproof garment trade, one factory will work up material which is already dyed and proofed, others will carry out their own dyeing, sending the work out to be proofed, subsequently working it up, alternatively carrying out the dyeing and proofing themselves. Others, again, will carry out the making and sewing in their own factory, while the practice of others is to contract with home workers for a considerable amount of their work.

Other factors which vary with different concerns in the same trade include methods of finance, of distribution, and of production, but as will be shown later, such difficulties are not insuperable, and by agreeing upon certain standards of principle, a measure of uniformity is achievable.

A great deal of work has been done already in certain industries towards agreement upon standard methods of costing and, encouraged by the success in these instances, other trade associations will doubtless be able to overcome the difficulties inherent to such questions as to what constitutes raw material, and as to segregating the costs of the product at different stages of its manufacture, but a further difficulty lies in their path if attempts are made to introduce standardized systems. A system with its blank forms, its analysis sheets, and its statistical returns, is merely a mechanical reminder. It is the mechanism of a procedure which has been agreed upon by the individuals concerned, who have decided that the presentation of certain results is essential to the good conduct of their business. The mechanism by means of which these results are obtainable is a matter of minor importance, a matter of detail which may be well left to each individual to devise according to his own particular local circumstances. To illustrate the difficulty of standardizing a system, it is only necessary to consider the simple case of time recording. In a very small factory a time note, giving the details of all the work performed during the week, which time note is signed or even in some cases made out by the foreman, may be perfectly satisfactory, both for the compilation of a pay roll and a calculation of job costs, if the foreman be in close enough contact with his men to ensure the accuracy of these returns. But in a factory employing 1,000 men it becomes necessary not only to have separate cards on which a man records his presence in the factory, which cards are used for the compilation of the pay roll, but it is also necessary to have job cards for each individual operation, and these may be made out by a time clerk, by the man himself, or may be recorded on a time recording clock, or by means of other mechanism. It is a matter of indifference how this work is carried out, so long as the results desirable in accordance with principles are obtained. Due to the nature of the process great differences in system may occur in two factories producing the same article. Thus, we may have inside one factory, bulk or process costing for intermediate products, and operation or detail costing for the final saleable products which are made up of different intermediate products. Another factory, producing only a few of the range of products of the first, may, on the other hand, carry bulk or process costing through to the completion of the finished product. Indeed, it is just at this point where it appears very necessary to come to some agreement in regard to the definition of the principal terms used in cost accountancy.

A cost must always be complete in itself, and the calculation of the true cost of production, which is a final quantity, appears to be possible by the adoption of standardized principles, but it is obvious that in the obtaining of these results the systems employed need not, and indeed cannot, be uniform in the majority of industries.

Having shown the basic differences which make uniformity of costing difficult even in one trade or branch of industry, and having shown the relative unimportance of the standardization of systems, it remains to show that there are certain principles of good cost accountancy which, if adopted, will enable any group to agree upon a standardized method of presenting their results once they have agreed upon certain fundamentals. These fundamentals should include—

(*a*) The definition of what are to be considered "raw materials" of each branch of the trade, and the method to be employed in segregating the costs, so that comparable figures are available for the man who purchases the raw material for certain processes, and for the man who manufactures these intermediate products in his own factory.

(*b*) The basis or unit for the purpose of comparing cost accounts; thus the unit may be the actual product in the case of articles which are sold as separate units, the square box as in the biscuit trade, the ton as in the sulphuric acid and coal industries, the gross as in certain metal trades, the kilowatt hour as in electricity supply, the therm as in gas supply, and the ton-mile as in the transport trade. Other units for the purpose of comparison will suggest themselves to particular trades.

(*c*) The extent to which the financing of the trade is to enter into the cost accounts.

(*d*) The separation of distribution from manufacturing expense.

Having agreed upon these fundamentals, the adoption of the following principles will enable industries to go a very long way towards the standardization of cost accountancy to meet their own particular needs, and should, in the majority of trades, achieve their object irrespective of the systems applied. These principles are—

1. That cost accounting must be based upon actual returns, namely, labour costs, material costs, and establishment costs.

2. That there are three fundamental cost accounts for all industries, viz., Wages Control Account, Material Control Account, and Establishment Expense Control Account.

3. That being based on actual expenditure, and results being given in terms of cash, the cost accounts must link up with and balance the financial accounts.

4. That cost accountancy distinguishes between factory cost, selling expense, and general administrative expense, and that each of these should be complete in itself and should be controlled separately to enable the directorate to observe the incidence of profit or loss.

5. That in all industries distinction can be drawn between the standing charges and running charges. That for all industries the former can be divided into rent expense, administrative or management expense, and fixed charges; that all the latter will be included in some, if not all, of the following—

Repairs and maintenance expense, indirect labour, power expense, factory supplies, inter-departmental service expense, and material expense.

The subdivision of these accounts may be different for each industry, with minor subdivisions for each trade.

6. That cost accountancy distinguishes between detail or product costing and bulk or process costing.

7. That in introducing cost accounting the successive steps should be—

(*a*) Simple recording of time and material.

(*b*) The calculation of establishment expenses and their control.

(*c*) The apportionment of expense and its control.

(*d*) The linking up with financial accounts.

These constitute the major principles. There remain certain minor principles where divergence of practice is possible, and these are as follows—

1. That work chargeable to plant extensions, or to any of its subdivisions, should bear its properly calculated share of expense, in that the Capital Account purchases through the cost accounts from the factory, and that unless expense be so charged, the factory products suffer in regard to enhanced cost of production to the advantage of the capital assets.

2. That interest on capital to be expended must always be considered when *estimating* the cost of new processes or products, but that in the actual cost accounts no interest on capital invested should be included.

3. That the factory when not working to full capacity should only be debited with that portion of the standing expense charges which correspond to the volume of its activity, and that the balance should be shown as a separate debit item, namely, the cost of idle time, in order to retain a sound basis for continuous comparison of factory efficiency, and to indicate to directors the loss due to lack of volume of work, which loss must be recovered by increase of sales or in the margin of profit on sales.

It is quite realized that the subject introduced is far too great to be adequately dealt with even in several volumes. One great need of industry in this country at the present time is the introduction of cost accountancy, not by amateurs, but by properly qualified men, who, with the encouragement and assistance of all those engaged in the industry, will be able to produce results which will enable the directorate to control their businesses scientifically and efficiently, and thus produce commodities on the most economical basis. This should undoubtedly build up the trade of the country, and tend to eliminate those periods of depression and unemployment, from one of which we are just emerging at the present time. There has been so much amateur work in the past by persons, who, though they are well disposed, do not recognize their ignorance of the principles of cost accountancy, that the introduction of a costing system instead of proving beneficial to a business, has resulted simply in more waste.

UNPRODUCTIVE LABOUR. (See INDIRECT LABOUR.)

VARIABLE EXPENSES. The indirect expenses of a business which fluctuate with the volume of output or amount of work done, such as indirect labour, indirect materials, power, light and heat, repairs and maintenance, charges for water, sundry works expenses, works clerical assistance, salaries, commissions on sales or output, stationery, etc. (See also ESTABLISHMENT EXPENSES.)

WAGE METHODS. (See REMUNERATION OF LABOUR —METHODS OF.)

WAGES ABSTRACT. (For description and illustration of form, see TERMINAL COSTING ; also LABOUR COST COLLECTING SHEET.)

WAGES ANALYSIS. (See PAY ROLL, also SERVICE ORDERS.)

WAGES BOOK. (See PAY ROLL.)

WAGES CARD. (See GATE CARD.)

WAGES CONTROL ACCOUNTS. (See COST CONTROL ACCOUNTS.)

WAGES DIRECT. (See DIRECT LABOUR.)

WAGES INDIRECT. (See INDIRECT LABOUR.)

WAGES AND MATERIAL SUMMARY. (See COST SUMMARIES.)

WAITING TIME. (See UNALLOCATED TIME, also SERVICE ORDERS.)

WASTER NOTES. (See REJECTION NOTE, also INSPECTION CERTIFICATE.)

WORKER'S TRANSFER NOTE. The form used for notifying the wages section of the Cost Department of the transfer of a worker from one department to another or change in occupation, or of a clock number or check number.

The transference of workers from one department to another must be notified to the wages section, so that the personal records of each worker can be altered accordingly. When the pay roll is arranged upon a departmental basis, the worker's name will require to be removed from amongst those of his late department and entered upon the sheets of his new department. The change in clock or check number will also necessitate an alteration in the pay roll if all employees are entered in sequence of clock numbers.

An illustration of a worker's transfer note is given (Form No. 102), the ruling of which is self-explanatory. The worker who is to be transferred would be handed a transfer note, and upon arrival at his new department would hand the note to his new

Form No. 102.

WORKER'S TRANSFER

DATE..

To...DEPARTMENT.

DEPT..

Please confirm your agreement to transference of...

Clock No.. .... Trade...from this department to

....department.

Remarks :. ....

....

....

....

....Foreman.

RECEIVING FOREMAN.			TRANSFER APPROVED BY
Signature.	Worker's Trade.	Clock No.	
			.... Works Manager.

NOTE TO RECEIVING FOREMAN–

If accepted in a trade different from above, state in what capacity worker will be employed.

THIS FORM MUST BE SENT TO COST DEPARTMENT IMMEDIATELY WORKS MANAGER'S APPROVAL IS OBTAINED.

foreman, who in turn would then pass it to the wages section of the Cost Department.

It should be noted that "loaned" workers must be dealt with quite differently to those who are permanently transferred from one department to another. In the case of workers temporarily loaned to another department, it is usual for them to book their time to an "other department service order," and the time so allocated, together with a charge for expenses, debited to the department receiving the benefit of their labour.

WORK IN PROGRESS CONTROL ACCOUNTS. (See COST CONTROL ACCOUNTS.)

WORKS CHARGES. (See FACTORY EXPENSES.)

WORKS COST. (See FACTORY COST.)

WORKS EXPENSES. (See FACTORY EXPENSES, also ESTABLISHMENT EXPENSES.)

WORKS FIXTURES AND FITTINGS consist of benches, racks, bins, desks, shelving, also partitions, etc., when not forming part of the main building. The value of works fixtures is part of the capital assets of the business. The cost of keeping such assets in good repair is a charge to the Factory Expense Account, and the amount apportioned or allocated direct to each department when departmentalization of expenses is necessary. If the maintenance and repair expense is large, the cost is collected through a system of service orders, which will show the amount of expense incurred by each department separately. With small concerns, however, it is usually sufficient to regard all works fixtures as forming part of the main building, and to include the cost of any repairs among the building expense. (See also FIXTURES AND FITTINGS.)

WORK TICKET. A written instruction containing full particulars of the quantity and nature of work to be performed against a works or production order.

A separate work ticket may be issued for each operation and for each worker engaged on a production order, or one ticket used for a series of operations to be performed on the same order.

A specimen work ticket is shown on page 375, which is issued for each operation or batch of work performed by the individual worker. A work ticket provides the Cost Department with information regarding the amount or quantity of work done by each worker, which forms the basis of computing the amount of piece work or bonus earnings when

Form No. 103.

WORK TICKET	No....................

Operation to be done.		Date Required.	To Department.	Order No.
No.	Description.	Operator—		Machine No.

OUT	PART AND DRAWING No.

	In.	Passed.	Checked.	Recorded by Progress Dept.
Signature				
Date				

Return with Work to Inspection Department as soon as Possible.

Form No. 104.

WORKS ORDER No.

WORK TICKET

NAME..

Clock No........... Date...192........

Component...

Drg. No......................... Symbol No......................

OPERATION.	Quantity	Passed	M/c. Scrap	Metal Scrap	Inspd. by
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

This ticket to be issued with material and to remain with job till completed.

After each operation, work and ticket to be sent to Inspection Department. After final test, work ticket to be returned to Planning Department.

Issued by.................. Date..........................	Issued to......................	View Room.................
Date first operation commenced.	Date last operation finished.	Planning Department.

calculated in conjunction with the times as shown on the worker's job card. At the bottom of the form are spaces for noting the quantities completed (i.e. " in," which refers to the quantity passed into the Inspection Department or view room), and the quantities that have passed inspection. It will be noted that the above form is a combined instruction and inspection ticket.

With those industries where standard products are made, it is sometimes more convenient to issue one work ticket to cover a series of operations that have to be performed on the same article. The work ticket in this instance will differ from that described above, as more space will be required for noting the various operations. A specimen form is given on page 376, from which it will be noted that provision is also made for the viewing of the work at the end of each operation.

A work ticket may not always be necessary, as particulars of the quantity and nature of the work to be done can often be inserted on the job card, and for a description of this method see BOOKING TIME TO JOBS—METHODS OF.

WORKS MANAGER—SALARY OF. In the majority of cases the amount of salary paid to a works manager will be directly allocated to factory expenses, but with some concerns this official may perform other duties besides those which relate to purely factory management.

With very small businesses the works manager may be responsible for the general management and control of all departments, and in such cases his salary should be apportioned over the various sections of the business. With the large concerns, and in those instances where his duties and responsibilities are confined to the factory, the salary is allocated direct to factory expenses.

WORKS ONCOST. (See FACTORY EXPENSES.)

WORKS OVERHEADS. (See FACTORY EXPENSES.)

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